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REVISION OF RECENT BAIRDIIDAE (OSTRACODA)

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UNITED STATES NATIONAL MUSEUM BULLETIN 295

Revision of Recent Bairdiidae (Ostracoda)

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SMITHSONIAN INSTITUTION PRESS
CITY OF WASHINGTON
1969

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This work forms number 295 of the *Bulletin* series.

FRANK A. TAYLOR
Director, United States National Museum

Introduction

The ostracode form genus "*Bairdia*" is probably the most over-extended category in the entire suborder Ostracoda. It has been applied with more or less serious intent to over 600 ostracode species ranging in age from Ordovician through Recent (Howe, 1955; van Morkhoven, 1963). Recently considerable progress has been made toward a more reasonable and useful classification of Paleozoic (Sohn, 1960) and post-Paleozoic, especially Triassic (Kollmann, 1960, 1963), fossil Bairdiidae. It has been generally agreed that the genus *Bairdia* sensu stricto should be restricted to the Upper Paleozoic, for its Carboniferous type-species *B. curta* McCoy and other closely allied species ranging from Devonian through Permian (Sohn, 1960). To include other forms under this name violates its morphologic and quite possibly its phyletic homogeneity.

At least 75 nominal species representing more nearly 200 morphologic species of "*Bairdia*" have been recognized in the Recent; at least as many species flourish undescribed in the rich and varied shallow-water assemblages of tropical and subtropical regions, which are still very poorly known. Thus "*Bairdia*" exemplifies today the confusion and frustration expressed by "*Cythere*" and "*Cythereis*" before 1925. The deceptively simple carapace morphology of this group combines with the apparent variability to discourage efficient discrimination of species. Probably three-quarters of all citations of non-European species of "*Bairdia*" are misidentifications or homonyms. This deplorable condition results in part from the difficulty of describing accurately and diagnostically the geometry of a smooth carapace, but even more it reflects the relative unimportance ascribed to "*Bairdia*" by many workers. Conversely, it is obvious that "*Bairdia*" can have little significance as a paleoecologic or stratigraphic index as long as its taxonomy remains unreliable.

There is a recurrent "heresy" of obscure origin and little factual substantiation to the effect that the "key" to relationships among Recent ostracode species is to be found in the soft parts, and that the carapace alone provides insufficient evidence for distinction of "biologic" or "natural" taxa. Application of this principle to Recent Bairdiidae has followed two courses: many taxonomists have admitted that *Bairdia* s. s. is restricted to the Paleozoic, and that one or more new genera need to be established for Recent forms, but they have

disavowed competence for the task and referred it to a successor, preferably a "zoologist"; they then proceeded to use the name sensu lato. Others, with no more information but with more courage of their convictions, have used instead *Nesidea*, which, because it is based on a Recent type species and by common agreement applies only to living species of "*Bairdia*," has been felt to be a more precise term though its morphologic boundaries are identical with "*Bairdia*."

Certainly, the taxonomist with the whole animal before him has a very real advantage over the one confronted by fragmentary skeletal remains. The soft-part anatomy of podocopid ostracodes does reveal rapidly evaluable data concerning phenetic and phyletic affinities of taxa, yet an equivalent amount of equally significant and entirely congruent information is embodied in the carapace morphology. It is true that in some forms, for example the Bairdiidae, carapace shape may be difficult to define, evaluate, and communicate, but this is a problem of technique rather than of inherent information, and it is a difficulty that will be reduced in future by application of geometric and statistical techniques of description and analysis. Meanwhile, the investigation of soft-part characters wherever possible may be recommended both as a shortcut to and a test of a stable taxonomic system. Thus it is logical to look among living species of the family Bairdiidae for a representative sampling of hard- and soft-part morphologies from which to construct and distinguish the higher taxonomic categories of the proposed revision.

In spite of the abundant representation of "*Bairdia*" in modern assemblages, very few species (25, 10 by Müller alone) have had soft parts even partially described. Only two authors (Müller, 1894; Kornicker, 1961) have attempted to specify characters that might be useful in establishing a generic classification; others have been prone merely to conclude that the anatomy of the species described is essentially that of a "*Bairdia*." As for the other available genera of Recent Bairdiidae, no soft parts have been described for well-established species of either *Triebelina* or *Bairdoppilata*. *Bythocypris* (female soft parts have been described for three species) has been misapplied to smooth-shelled forms of indeterminate outline, uncertain affinities, and indiscriminate age. *Anchistrocheles* has been effectually ignored for lack of well-described species to be assigned there.

The wealth of living material collected by recent expeditions and especially by the International Indian Ocean Expedition brings the total of living species of Bairdiidae with illustrated or illustrable soft parts to 54. At this point it becomes both feasible and obligatory to attempt to use this information to establish a generic classification that will be an improvement over the anarchy now prevailing. This I have tried to do. The resulting classification is both preliminary and

tentative; it is hoped that further data will confirm the trends suggested here and permit greater detail and precision of distinction within this framework.

Because of the limitation of time, especially time required for illustration, this classification is based on relatively few "key" characters taken in about equal number from the carapace and soft-part anatomy. Empirical observation suggests that they yield relatively consistent and distinctive differential diagnoses. However, as methods for rapid and objective simultaneous evaluation of many characters become more practicable, such as those of numerical taxonomy, we may expect these subjective distinctions to be confirmed and ramified. Application of numerical taxonomic techniques to Ostracoda has been hampered by lack of basic anatomical data. One purpose of this study has been to accumulate anatomical and homological information for the Bairdiidae, which stand in special need of quantitative evaluation. Sufficient data are now available for enough species to sustain an analysis of this type; it is only a matter of selecting and codifying characters.

This study, then, has a 3-fold purpose: (1) To identify and describe some of the interesting and taxonomically significant species of modern Bairdiidae collected by recent expeditions, especially in the Indian Ocean region; (2) to evaluate and illustrate some of the variety of carapace and appendage anatomy that is possible in this group; and (3) to use this new information in establishing a tentative classification, as a first step in the iterative process of achieving a generally accepted and useful nomenclatural system for this family. Although only living species are considered in this report, it is presumed that the taxa established are equally appropriate for any post-Paleozoic Bairdiidae.

Acknowledgments

This study forms a part of the project "Ostracodes of the Indian Ocean," directed by Richard H. Benson, Division of Invertebrate Paleontology, Smithsonian Institution, supported by grants to him from the National Science Foundation and the Smithsonian Research Foundation, and based chiefly on the collections of the United States Program in Biology of the International Indian Ocean Expedition (1963–1964). It was completed during my tenure as research associate with Benson at the Smithsonian Institution (1965–1967), who also put his collections and laboratory facilities at my disposal and contributed the photographs assembled in Plates 1 and 2.

Collections of other institutions and individuals have contributed to this study. I should particularly like to thank Louis S. Kornicker, Division of Crustacea, Smithsonian Institution, for the use of his

Bahama collections. I was priviledged to study the *Challenger* lectotypes of Brady (1880) while they were on loan to Harbans S. Puri, Florida State Geological Survey, from the British Museum (Natural History). Benson, Kornicker, and I. Gregory Sohn (U.S. Geological Survey) contributed valuable suggestions from their reading of the manuscript but must not be held responsible for any of the opinions contained herein.

Taxonomy

PREVIOUS CLASSIFICATIONS.—Müller (1894) described carapaces and soft parts of 10 species of "*Bairdia*" and assigned them to one of two groups on the following criteria: Group 1 (*subdeltoidea* group): anterior margin of both valves without denticles, median segment of copulatory organ penetrated by copulatory tube (*B. obscura, decipiens, frequens, mediterranea*, and *minor*); Group 2: anterior margin of left valve with denticles and of right valve with or without denticles, median segment of copulatory organ not perforated by copulatory tube (*B. longevaginata, corpulenta, serrata, reticulata*, and *raripila*). Müller also recognized and described other characters with taxonomic significance, as established below, whose distribution is not congruent with these two groups.

Kornicker (1961), combining Müller's species with five species of Bahaman "*Bairdia*," recognized four groups of "*Bairdia*" plus *Bairdoppilata* based on the morphology of the male copulatory organ. He noted that these divisions resulted in a coincident clustering of

TABLE 1.—Comparison of the proposed generic-level classification of 14 species of Bairdiidae with the species-groups recognized by Müller (1894) and Kornicker (1961)

"*Bairdia*" species	Müller (1894)	Kornicker (1961)	Maddocks (herein)
decipiens	1	I	*Neonesidea*
frequens	1	I	*Neonesidea*
mediterranea	1	I	*Neonesidea*
minor	1	I	*Neonesidea*
obscura	1	I	*Neonesidea*
corpulenta	2	II	*Neonesidea*
longevaginata	2	I	*Neonesidea*
raripila	2	–	?*Triebelina*
reticulata	2	III	?*Paranesidea*
serrata	2	II	Uncertain
gigacantha	–	I	*Paranesidea*
harpago	–	II	*Paranesidea*
arostrata	–	IV	?*Paranesidea*
carinata	–	*Bairdoppilata*	*Bairdoppilata*

species with similar carapace morphology, but that the distinctions among carapace groups seemed less marked; he suggested that the carapace is more conservative than the soft-part anatomy in this group. He refrained from naming these implied generic categories, believing that a taxonomic system based principally on carapace structures would be more useful. Table 1 summarizes the classifications of Müller and Kornicker as compared to that proposed below.

Puri (1964, p. 196) has suggested that at least three groups of "*Bairdia*" are distinguishable on muscle-scar pattern alone; this opinion is also held by Hulings (pers. comm.) and is certainly supported by the material described below (see Figure 3).

Kollmann (1963) recognized five subfamilies among Triassic genera belonging to the family Bairdiidae: Bairdiinae Sars, 1923; Alanellinae Boucek, 1936; Nodobairdiinae Kollmann, 1963; Triebelininae Kollmann, 1963; and Carinobairdiinae Kollmann, 1963. On the basis of external sculpture alone he pointed out that it would be worthwhile to revive *Glyptobairdia* (by a partitioning of *Triebelina*) for the Recent representative of a lineage that already in the Triassic (*Carinobairdia*) is distinct from and coexists with *Triebelina* and related genera. Unfortunately, the hingement of Triassic Carinobairdiinae is unknown, but if we postulate that it is at least potentially bairdoppilatan, then three of Kollmann's subfamilies are represented by Recent genera and might be incorporated into the proposed scheme as tribes (Bairdiini, Triebelinini, Carinobairdiini) within the subfamily Bairdiinae.

Proposed classification.—On the basis of the species studied, the following categories are readily distinguishable among living Bairdiidae:

Subfamily Bairdiinae Sars, 1888
- *Neonesidea*, new genus
- *Paranesidea*, new genus
- *Triebelina* Bold, 1946
- *Bairdoppilata* Coryell, Sample and Jennings, 1935
  - *B.* (*Bairdoppilata*) Coryell, Sample and Jennings, 1935
  - *B.* (*Glyptobairdia*) Stephenson, 1946

Subfamily Bythocypridinae, new subfamily
- *Bythocypris* Brady, 1880
- *Zabythocypris*, new genus
- *Anchistrocheles* Brady and Norman, 1889

Living Bairdiidae may be separated easily into two subfamilies, Bairdiinae and Bythocypridinae, which correspond to the form genera "*Bairdia*" and "*Bythocypris*" of current usage. Each subfamily may be diagnosed on a characteristic adductor muscle-scar arrangement and is substantiated by consistent patterns of carapace and appendage morphology. The name Bairdiinae is retained here

because of the high probability that *Bairdia* s. s. belongs here, as well as many other extinct genera.

Within the subfamily Bairdiinae at least nine genera or subgenera may be distinguished. Three of these taxa already have available names (*Triebelina*, *Bairdoppilata*, and *Glyptobairdia*). For each of these categories the new soft-part data reinforce the distinctiveness of the taxon that has long been deduced from carapace structure. The remaining species of "*Bairdia*," by far the majority, fall naturally into two major groups for which the new names *Neonesidea* and *Paranesidea* are proposed. These five genera and subgenera are easily recognizable by muscle-scar patterns alone (see Figure 3); comparable distinctiveness is suspected but not yet proved for scars of the unnamed species-groups within *Neonesidea* and *Paranesidea*.

Neonesidea, to which the majority of described Recent species of "*Bairdia*" belong, contains three morphologic groups that will deserve at least subgeneric status when better information is available for their diagnosis. The carapace morphology, and perhaps also appendage anatomy, of certain cold- or deepwater species assigned here to *Paranesidea* and *B.* (*Bairdoppilata*) is sufficiently unlike that of the typical shallow-water tropical forms that separate taxa will be required ultimately for them. Finally, at least three species are indicated with morphologic characters intermediate between *Neonesidea* and *Paranesidea*. Establishment of these new taxa should be postponed until more species may be investigated.

The differences in carapace and appendage anatomy between *Triebelina* and *Paranesidea* are insufficient to support the family-level distinction of Kollmann (1963). In fact, on the scale established by the other generic diagnoses of this report, they might have been established as subgenera of one genus, which would have then retained the older name *Triebelina*. However, it seems undesirable to submerge the identity of the numerically small and morphologically strictly defined *Triebelina* by the widespread and heteromorphic form *Paranesidea*, whose limits and ancestry are at present only conjectural.

A brief comparison of the essential anatomical features of these five genera and subgenera of Bairdiinae is presented in Table 2.

Species assigned to *Bythocypris* in this report include several abyssal species for which a new genus or subgenus should be named, but the absence of described male anatomy for typical European species renders *Bythocypris* difficult to diagnose. The peculiar form *Anchistrocheles* is herein reinstated by description of new and previously established species. A morphologically intermediate genus, *Zabythocypris*, is proposed for a distinctive group of rare but characteristic abyssal species.

TABLE 2.—Summary of diagnostic characters of five genera and subgenera of Recent Bairdiidae

DISTAL ANTENNAL CLAW	MALE	FEMALE
Neonesidea	sigmoid hook	smooth
Paranesidea	smooth	smooth
Triebelina	–	distally barbed
Bairdoppilata	smooth	smooth
Glyptobairdia	smooth	smooth
ANTERODISTAL ANTENNAL SETA	MALE	FEMALE
Neonesidea	absent or vestigial	long and thin
Paranesidea	short and thin	long and thin
Triebelina	–	long and medium thickness
Bairdoppilata	as long and thick as distal claw	as long and thick as distal claw
Glyptobairdia	almost as long and thick as distal claw	almost as long and thick as distal claw
POSTERODISTAL(FUSED) ANTENNAL CLAW	MALE	FEMALE
Neonesidea	smooth	smooth
Paranesidea	serrate to pectinate	very finely serrate
Triebelina	–	distally barbed
Bairdoppilata	smooth	smooth
Glyptobairdia	smooth	smooth
VIBRATORY PLATE OF FIRST THORACIC LEG: NUMBER OF UNFEATHERED SETAE PROXIMALLY SEGREGATED	MALE	FEMALE
Neonesidea	2 equal length	1
Paranesidea	4 equal length	4 equal length
Triebelina	–	4 first seta longest
Bairdoppilata	4 equal length	4 equal length
Glyptobairdia	4 equal length	4 equal length
NUMBER OF FURCAL SETAE (NEVER DIMORPHIC)		
Neonesidea	5 long, 2 short	
Paranesidea	4 long, 2 short	
Triebelina	4 long, 2 or 3 short	
Bairdoppilata	7 all long	
Glyptobairdia	7 all long	

TABLE 2.—Summary of diagnostic characters of five genera and subgenera of Recent Bairdiidae—Continued

CARAPACE SURFACE TEXTURE		
Neonesidea	smooth or finely punctate	
Paranesidea	coarsely punctate	
Triebelina	coarsely punctate, nodose, or ridged	
Bairdoppilata	smooth or finely punctate	
Glyptobairdia	punctate with loop-and-bar ridge pattern	
CARAPACE STRUCTURE		
Neonesidea	thin	
Paranesidea	robust	
Triebelina	very robust	
Biardoppilata	thin	
Glyptobairdia	very robust	
CARAPACE LATERAL OUTLINE		
Neonesidea	elongate subtriangular	
Paranesidea	rotund	
Triebelina	subquadrangular	
Bairdoppilata	rounded subhexagonal	
Glyptobairdia	subhexagonal	
CARAPACE HINGEMENT	HINGE BAR	AUXILIARY DENTITION
Neonesidea	may be finely serrate	absent
Paranesidea	smooth	absent
Triebelina	smooth	absent
Bairdoppilata	smooth	present
Glyptobairdia	serrate	present
MUSCLE-SCAR PATTERN	CONFIGURATION	INDIVIDUAL SCARS
Neonesidea	4 zigzag rows	wedge-shape
Paranesidea	tight spiral	subcircular
Triebelina	4 diagonal rows	irregular oblong
Bairdoppilata	loose spiral	oblong
Glyptobairdia	3 horizontal rows	subquadrate
MARGINAL DENTICULATION	RIGHT VALVE	LEFT VALVE
Neonesidea	anterior: none or few posterior: none or many	anterior smooth posterior denticulate
Paranesidea	anterior and posterior frilled	anterior and posterior denticulate
Triebelina	stout spines	stout spines
Bairdoppilata	smooth or frilled	frilled or denticulate
Glyptobairdia	stout spines	stout spines

Material

The most fertile source of living material for this study was in the collections of the U.S. Program in Biology, International Indian Ocean Expedition, which include three types of collections: (1) Shore-based collections by the author from littoral and reef environments around Nosy Bé, Madagascar; (2) collections, mainly by dredging, of cruises 7–9 of the RV *Anton Bruun* in the Mozambique Channel; (3) collections by various participants at islands visited on these cruises. Because of the great number of specimens and species involved, the shallow-water subfossil assemblages included in these collections have not been systematically covered here. The species selected for inclusion in this report are those for which abundant living material is available, all species of the Nosy Bé fauna, and the characteristic bairdian constituents of the relatively monotonous abyssal faunas. Thus this paper represents a "reconnaissance" survey with emphasis on taxonomic diversity rather than regional comprehensiveness.

Also included here are the bairdiid components of the assemblages currently (1967) being studied by R. H. Benson for his analysis of the abyssal ostracode biofacies. These include collections of the USNS *Eltanin*, chiefly in Antarctic waters; collections of cruise 11 of the *Anton Bruun* in the southeast Pacific; and collections of the U.S. Fish Commission Steamer *Albatross* in many parts of the world, especially the Gulf of Mexico and southeast Pacific.

The Bahama collections of L.S. Kornicker permit further description of the five species of "*Bairdia*" he recognized there as well as two other Caribbean species. Other collections in the U.S. National Museum, chiefly those of Tressler and Benson, have yielded single species whose redescription contributes to the coverage of this project.

STATION LOCALITIES

Collections of the RV *Anton Bruun* cruises 7 and 8 in the Mozambique Channel (see Figure 1):

STATION	LATITUDE	LONGITUDE	DEPTH (m)
360B	27°38′S	33°23′E	1360
361B	26°34′S	35°59′E	1829
361G	25°50′S	37°21′E	2750
361H	25°39′S	37°45′E	3750
363B	23°45′S	43°10′E	2980
363D	23°45′S	43°11′E	1605
363E	23°40′S	43°21′E	1860
363G	23°38′S	43°24′E	1350
363J	23°36′S	43°24′E	1280
363K	23°43′S	43°25′E	1190
363L	23°17′S	43°30′E	841

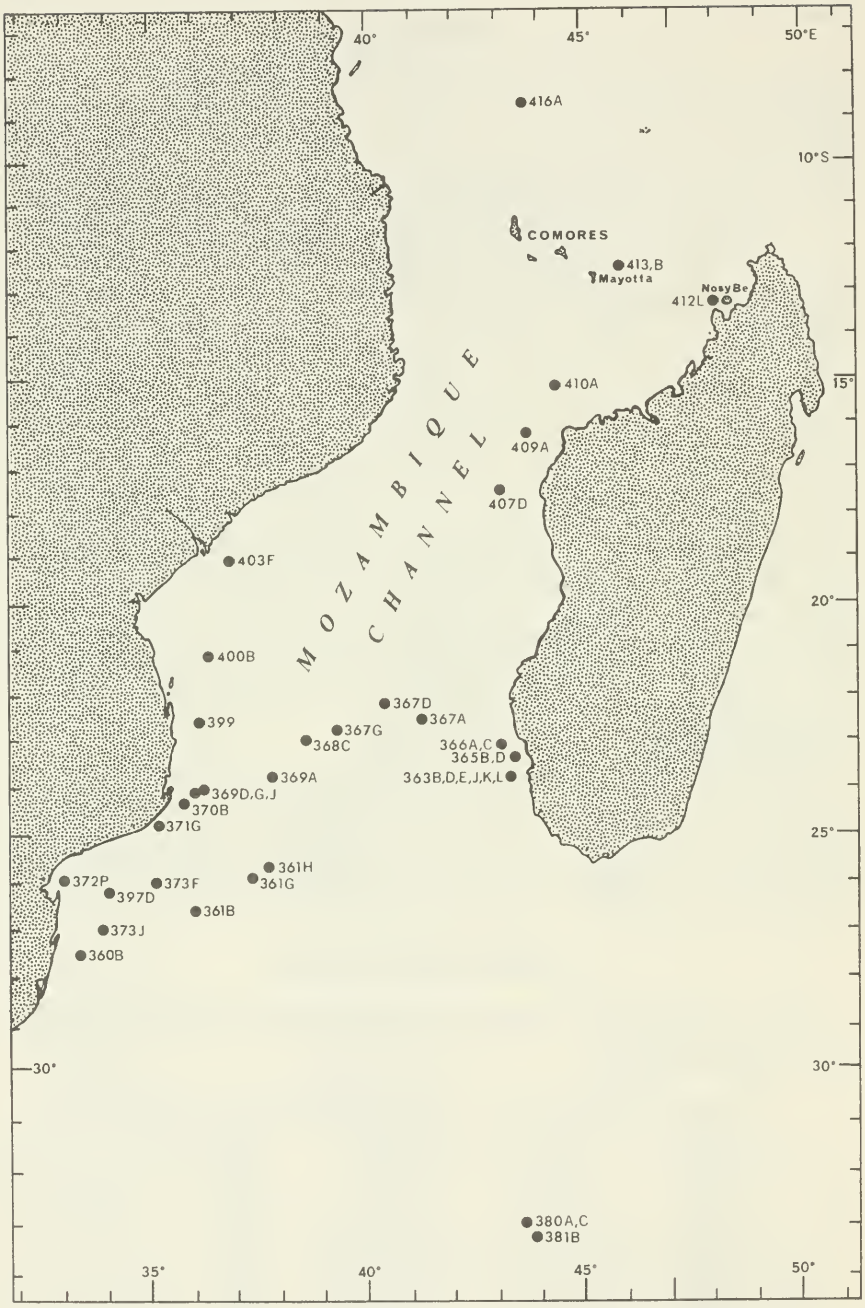

FIGURE 1.—Locations of collecting stations of cruises 7 and 8 of the *Anton Bruun* in the Mozambique Channel from which species of Bairdiidae are described.

STATION	LATITUDE	LONGITUDE	DEPTH (m)
365B	23°19′S	43°33′E	420
365D	23°20′S	43°32′E	695–475
366A	23°09′S	43°09′E	2300
366C	23°09′S	43°07′E	2710
367A	22°36′S	41°18′E	3350
367D	22°15′S	40°21′E	2200
367G	22°42′S	39°19′E	3140
368C	23°00′S	38°37′E	2995
369A	23°48′S	37°47′E	2270
369D	24°04′S	36°16′E	1720
369G	24°12′S	36°02′E	1205
369J	24°12′S	36°01′E	1140
370B	24°25′S	35°47′E	910
371G	24°49′S	35°13′E	73
372P	25°57′S	33°02′E	37
373F	26°02′S	33°08′E	366
373J	26°58′S	33°53′E	880
380A	32°58′S	43°37′E	935
380C	32°58′S	43°41′E	950
381B	33°13′S	43°51′E	38
397D	26°14′S	34°04′E	665
399	22°33′S	36°10′E	925
400B	21°12′S	36°24′E	1530
403F	19°09′S	36°55′E	88
407D	17°32′S	43°05′E	1360
409A	16°12′S	43°41′E	400
410A	15°07′S	44°21′E	3100
413	12°32′S	45°50′E	3530
413B	12°32′S	45°50 E	3530
416A	08°45 S	43°39′E	3850
421A	02°54′S	40°23′E	34

Collections of the *Anton Bruun* cruise 11 in the southeast Pacific (see Figure 2):

95	8°30.5′S	81°40′W	4332–4423
113	8°44′S	80°45′W	5986–6134
179	8°54′S	80°41′W	4823–4925

Collections of the USNS *Eltanin* (see Figure 2):

418	62°39–40′S	56°8–10′W	311–426
740	56°06–07′S	66°19–30′W	384–494
1248	59°57′S	136°37′W	3495–3386
1250	60°03–05′S	132°51–56′W	3638–3825
1345	54°50–51′S	129°46–48′W	915–1153
1418	54°32′S	159°02′E	113–92

FIGURE 2.—Locations of collecting stations of the *Albatross*, *Eltanin*, *Anton Bruun*, and International Indian Ocean Expedition from which species of Bairdiidae are described.

Collections of the U.S. Fish Commission Steamer *Albatross* (see Figure 2):

STATION	LATITUDE	LONGITUDE	DEPTH (m)
2383	28°32′N	88°06′W	2160
2385	28°51′N	88°18′W	1335
2392	28°47′30″N	87°27′W	1324
2751	16°54′N	63°12′W	1257
2763	24°17′S	42°48′30″W	1227
2808	00°36′30″S	89°19′W	
3376	03°09′N	82°08′W	1132
4693	26°30′S	105°45′W	2089
4723	10°14′S	107°45′W	3475
4728	13°47′30″S	114°22′W	1930
5650	4°53′45″S	121°29′E	988

Shallow-water collections from localities visited by participants in the I.I.O.E. (see Figure 2):

412L			30 m	Banque de Cinq Mètres near Nosy Bé, Madagascar (by R. H. Benson)
LK–12			0–1 m	Galle Harbor, Ceylon. *Thallassia* sand flats (by L. S. Kornicker)
LK–28	4°4′53″S	39°40′35″E	1–4 m	Mombasa, Kenya, Andromache Reef, near south channel entrance to port, thin sand covering with *Thallassia* (by L. S. Kornicker)
LK–29	4°5′10″S	39°40′30″E	½–1 m	Mombasa, Kenya. Andromache Reef, reef lagoon landward of reef flat, thin sand with *Thallassia* (by L. S. Kornicker)
LK–39				Mayotte Island, Comores (by L. S. (Kornicker)
Grand Comoro 1			20 m	Grand Comoro Island, Comores. Coral reef sand (by Bruce Rodgers)
HA–33	27°16′N	33°47′E	0–1 m	Ghardaqua, Egypt. Washings of algae from low tide level (by H. A. Fehlmann)
Tulear			10 m	Tulear, Madagascar. Reef sand in tide pocket (by R. H. Benson)
Nosy Bé			0–40 m	Nosy Bé, Madagascar. Various littoral and inner sublittoral marine collections around Nosy Bé and nearby mainland (by R. F. Maddocks)
Anse Royale			10 m	Anse Royale, Mahé, Seychelles. ⅛ mile from shore, between reefs

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Miscellaneous collections now in the Smithsonian Institution (see Figure 2):

GIL 615	34°17′S	18°27′E	6 m	False Bay, South Africa (from J. H. Day)
RM1004				George Sound, New Zealand

Ifalik Atoll: USNM 98545–98554, Acc. No. 200652. Washings of algae, alga-encrusted rocks, and dead coral fragments from various littoral, reef, and lagoon collecting localities at Ifalik Atoll, West Caroline Islands (by D. P. Abbott).

Tortugas: USNM 88843, 88863–88866, Acc. No. 111167. Debris of broken-up *Porites* clumps, west side of Loggerhead Key, depth 12–15 feet, Tortugas Florida (by W. L. Schmitt; see Tressler, 1949)

Bimini: Collections in the vicinity of the Bimini Islands, Great Bahama Bank (by L. S. Kornicker; see Kornicker, 1961)

Andros: USNM Acc. No. 265635; collections in the vicinity of Andros Island, Great Bahama Bank (by M. L. Jones)

USNM Acc. No. 271766, 66–A–9–XV, 28°15′N, 87°02′W, 1000 m depth (by Willis Pequegnat)

West Coast of Florida and Florida Bay: Shelf collections (see Benson and Coleman, 1964)

1003: Intertidal collection at Prince Edward Island (South Indian Ocean) (by N. R. Fuller)

Systematic Descriptions

Family BAIRDIIDAE Sars, 1888

Subfamily BAIRDIINAE Sars, 1888

Family Bairdiidae Sars, 1888, p. 288.—Müller, 1894, p. 265.—Morkhoven, 1962, p. 113.—Hartmann, 1963, p. 123.—Kollmann, 1960, p. 160 (part).

Subfamily Bairdiinae (within family Cypridídae), Sars, 1923, p. 62.

Family Nesideidae Müller, 1912, p. 240.

Type-genus.—*Bairdia* McCoy, 1844, p. 164.

Diagnosis.—Carapace ovate to subhexagonal in lateral view, left valve larger than right and overlapping it dorsally and ventrally, usually of distinctly different shapes; right valve hinge a simple bar with dorsal groove, left valve hinge an incised groove with dorsal shelf and ventroterminal triangular sloping platforms; adductor muscle-scar pattern characteristically composed of 8–10 scars arranged in three anterior plus one posteroventral rows of 2–3 scars each.

Antennules 7-segmented, 3 terminal podomeres with tactile setae much longer than those of preceding podomeres. Antenna with 6 podomeres (endopodite with 4), sixth podomere completely fused with stout posteroventral claw, carrying larger distal claw, antero-distal seta, and 1 or 2 tiny simple setae. Mandible with masticatory part of 4 stout trilobed denticles, 2 or 3 similar but less complex denticles, and tiny setae; exopodite with 3 graduated feathered setae.

FIGURE 3.—Representative muscle-scar patterns of Recent genera of the family Bairdiidae: A, *Neonesidea parilihamata*, n. sp.; B, *N. cracenticlavula*, n. sp.; C, *N.* sp. 1; D, *N. schulzi schulzi* (Hartmann); E, *N. antonbruuna*, n. sp.; F, *N. dinochelata* (Kornicker); G, *B.* (*Bairdoppilata*?) *simplex* (Brady); H, *B.* (*Bairdoppilata*) *alcyonicola*, n. sp.; I, *B.* (*Glyptobairdia*) *coronata* (Brady); J, *B.* (*Bairdoppilata*?) *villosa* (Brady); K, *Triebelina reticulopuncta* Benson; L, *T. sertata* Triebel; M, *T. schyroconcha*, n. sp.; N, *Paranesidea* sp. 3; O, *P. fracticorallicola*, n. sp.; P, *P. algicola*, n. sp.; Q, *P. gigacantha* (Kornicker); R, *Anchistrocheles antemacella*, n. sp.; S, *A. bensoni*, n. sp.; T, *A.* sp. 1; U, *Zabythocypris ancipita*, n. sp.; V, *Z. helicina*, n. sp.; W, *Bythocypris eltanina*, n. sp.; X, *B. spiriscutica*, n. sp.; Y, *B. reniformis* Brady.

Masticatory processes of maxilla long and slender with 2–6 setae, each of differentiated size and structure, posteroventral platelet bearing 6 heavily chitinized unfeathered setae. Vibratory plate of first thoracic leg triangular, with 4 unfeathered ventral setae and many feathered setae; basal podomeres of second and third thoracic legs with two ventral setae; all legs pediform. Furca with 6 or 7 setae, seta 2 twice as long as others and feathered. Male brush-shaped organ asymmetrical. Copulatory organ large, pigmented, with hemioval median segment, smaller distal segment, arched copulatory tube; genital lobe with doubly coiled spiral tube. Distal portions of appendages and genitalia, carapace selvage, exterior setae, and sometimes part of epidermis pigmented, dark brown to black.

Remarks.—The appendage and genital anatomy of the Bairdiinae are both complex and remarkably consistent. I would estimate at least 300 characters to be observable that are capable of some degree of variation, but for mere distinction of species or genera less than 10 characters are necessary. Indeed, the copulatory organ alone will sometimes be all that is necessary to identify a male to species. Identification of a female (ignoring the carapace) is more difficult and requires comparison of minute differences on very many structures. Unfortunately, most published illustrations are not sufficiently accurate for detailed comparisons.

For a few of the species described here the entire anatomy is illustrated, both to demonstrate the general consistency of structure from species to species, and to provide a sampling of the variation possible in structures not usually considered to be diagnostic. That such taxonomically controlled variation exists, for example, in the maxilla (generally considered the most conservative of appendages and rarely illustrated) may be seen in the comparison of Figures 6*a*, 15*e*, *f*, 18*d*, 22*a*, 25*d*, 32*a*, 34*b*, 38*a*, 39*g*, and 40*f*. It would seem that the number, length, thickness, shape, pectination, barbs, etc., of individual setae on the masticatory processes are capable of sufficient variations and combinations that each species has its own "fingerprint." The usefulness of such a character, however, is severely limited by the small size and difficulty of separating individual setae within these bundles.

Neonesidea, new genus

Type-species.—*Triebelina schulzi* Hartmann, 1962, p. 44.

Etymology.—Greek *neos*, new + *Nesidea* Costa.

Diagnosis.—Carapace streamlined ovate and smooth, muscle-scar pattern with 8 elongate scars arranged in three horizontal or diagonal

rows plus posterior inserted wedge; distal antennal claw of male with sigmoid incision, anterodistal seta thin, fused claw smooth; first thoracic leg with 4 unfeathered setae of vibratory plate widely spaced; furca with 7 setae, the last two very tiny; male copulatory organ of simple hinged 3-part structure with stiff arched copulatory tube.

Description.—Carapace thin, smooth or faintly pitted; lateral outline varying from ovate to subrhomboidal, lacking any posterodorsal concavity or pronounced ventral sinuation, posterior end usually acutely tapered; anterior margin of right valve with or without few short denticles, left anterior margin smooth, left or both posterior margins edged with fine denticles; posteriormost spine may be enlarged to long spine or platelet supporting posterodorsal siphonate projection formed by fused lamelliform setae. Eight elongate adductor muscle scars arranged in three horizontal-diagonal rows and a fourth wedge-shaped inserted row. Epidermis deeply pigmented in whole or part, accounting for dark brown color pattern of living animal; medial oval opaque pattern, rarely any other pattern. Hinge thin and simple, median elements may be very finely striate. Fused marginal zone moderately wide, radial pore canals straight and abundant.

Antenna with fifth podomere very long and thin, more than twice as long as fourth; sixth podomere fused with stout simple curved claw, smooth in both sexes, carrying besides the distal claw an anterodistal seta and an extremely thin rodlike sensory (?) seta; distal claw very long and sturdy, in males cleft by a sigmoid incision into a bifid hook, in females tapering smoothly to a slender point; anterodistal seta short and thin or absent in males, long but thin in females, extending to two-thirds the length of distal claw. Vibratory plate of first thoracic leg with four unfeathered, more heavily chitinized setae spaced widely along the ventral margin; male with the first two of these setae closely grouped at anteroventral corner and directed ventrally, others directed posteriorly; female with only the first seta so segregated. All thoracic legs with podomere 4 long and slender, more than twice as long as podomere 3, distal claw long and thin and tapering to simple point. Furca generally with 7 setae, seta 2 twice as long as others and feathered, setae 6 and 7 very much shorter than others. Male copulatory organ of relatively simple, hinged 3-part structure, with the three lobes distinctly separable, terminal lobe very much smaller than median lobe and with digitate protrusions very small or absent; copulatory tube reaches in a broad stiff arch from junction of basal and median lobes to beyond tip of median lobe, there generally penetrating and emerging distally beside terminal lobe as slender flexible thread.

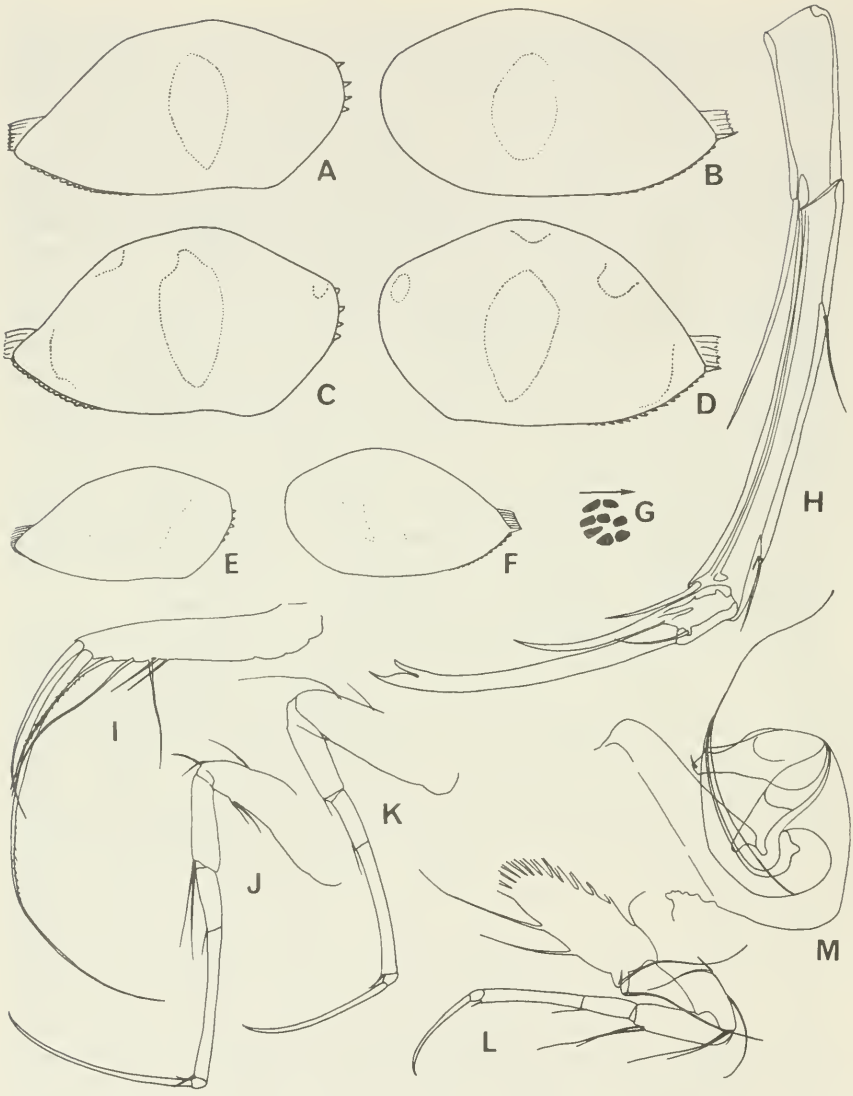


FIGURE 4.—*Neonesidea schulzi* (Hartmann). *N. s. schulzi* (Hartmann): A,B, Male USNM 121252; C,D, female USNM 121253. *N. s. ifalikensis*, n. subsp.: E, H–M, Male USNM 93549 specimen 465; F,G, male USNM 98549 specimen 466.

A–F, Exterior carapace; G, right exterior muscle-scar pattern; H, antenna; I, furca; J, third thoracic leg; K, second thoracic leg; L, first thoracic leg; M, copulatory organ. A–D, × 43; E, F, × 29; H, I, M, × 301; J–L, × 127.

SPECIES INCLUDED.—Recent species for which soft parts have been described, listed by original binomen:

Triebelina schulzi Hartmann, 1964
Bairdia corpulenta Müller, 1894
Bairdia decipiens Müller, 1894
Bairdia dinochelata Kornicker, 1961
Bairdia frequens Müller, 1894
Bairdia cf. *frequens*, Reys, 1964
Bairdia gerda Benson and Coleman
Triebelina gierloffi Hartmann, 1959
Bairdia incognita Lerner-Seggev, 1964
?*Bairdia inflata* (Norman), 1862 of Brady, 1868
Bairdia longevaginata Müller, 1894
Bairdia mediterranea Müller, 1894
Bairdia minor Müller, 1894
Bairdia obscura Müller, 1894
Bairdia phlegeri McKenzie and Swain, 1967
?*Bairdia simuvillosa* Swain, 1967
Bairdia subdeltoidea Münster of Sars, 1888

Six new species and one subspecies are named and described herein:

Neonesidea antonbruuna, new species
Neonesidea arenigena, new species
Neonesidea cracenticlavula, new species
Neonesidea parilihamata, new species
Neonesidea pateriformis, new species
Neonesidea aduncicorpulenta, new species
Neonesidea schulzi ifalikensis, new subspecies

The following species are a few of the many known only from empty carapaces that may be assigned to *Neonesidea* on the basis of carapace shape and muscle-scar pattern illustrated in existing literature:

Bairdia amygdaloides Brady of Brady, 1890
Bairdia attenuata Brady, 1880
Bairdia crosskeiana Brady, 1866
Bairdia fusca Brady, 1880
Bairdia longisetosa Brady, 1902
Bairdia woodwardiana Brady, 1880

NOMENCLATURAL DISCUSSION.—The genus *Nesidea* was proposed by Costa (1847, 1849–1853) for the single species *N. hirta*. The illustrations of this species are naively rendered and contain many glaring errors. While the species is certainly a bairdiid ostracode and, according to the structure of the copulatory organ and carapace outline, probably belongs to this first generic grouping of species as diagnosed above, the many errors prohibit identification of this form with any one of the several species of this general form known to inhabit the Bay of Naples. Without a type specimen, *N. hirta* and the genus *Nesidea* must remain technically available but operationally undefinable units. Stability of nomenclature will best be conserved by setting aside the names *Nesidea* and *N. hirta* as nomina dubia.

Ecology.—Species of *Neonesidea* are confined to rather shallow water (less than 100 m). They are characteristic members of epifaunal assemblages on marine algae, grasses, sponges, and, to a lesser extent, detrital accumulations and associated sandy sediments. While they are extremely abundant in reef and platform habitats just below low tide level, they are not known to occur in the littoral zone at Nosy Bé. Subfossil carapaces are chiefly present in shallow-water sands, especially abundant near reefs or other environments where found living.

Distribution.—Worldwide, chiefly in tropical and subtropical areas.

Affinities.—The species included in this genus may be further arranged into three smaller groups, typified by the species *N. schulzi* (Hartmann), *N. dinochelata* (Kornicker), and *N. pateriformis*, new species, and distinguished especially by carapace shape and muscle-scar pattern. Within the *N. schulzi* group fall most of the species described by Müller (1894) as well as *N. gierloffi* (Hartmann), *N. gerda* (Benson and Coleman), *N. phlegeri* (McKenzie and Swain), and the new species *N. antonbruuna*, *N. cracenticlavula*, and *N. aduncicorpulenta*. The *N. dinochelata* group includes *N. parilihamata*, new species, and other species that are at present either undescribed or known from carapaces only, such as *N. woodwardiana* (Brady) and perhaps forms identified as *B. crosskeiana* Brady by Puri (1960) and *B. amygdaloides* Brady by Brady (1890); the most interesting feature of this group is the fusion of muscle scars yielding a zigzag alignment of four wedge-shaped scars. Finally, two extremely compressed forms with nearly oval lateral outline, *N. tenera* (Brady) and *N. pateriformis*, new species, seem sufficiently distinctive to represent a third potential subgenus. Yet another category might be added either here or within *Paranesidea* for such species as *Bairdia serrata* Müller, 1894, *Bairdia roquebrunensis* Rome, 1942, and "Genus Uncertain species 1" of this paper, which combine appendage characters of *Neonesidea* with the marginal spinosity and high-arched dorsal outline of *Paranesidea*.

Neonesidea schulzi (Hartmann), 1964
Neonesidea schulzi schulzi (Hartmann), 1964

Figures 4*a–d*, 5, 6

Triebelina schulzi Hartmann, 1964, p. 44, pls. 4, 5: figs. 14–22.
Species BA, Maddocks, 1966, p. 47, fig. 22.

Diagnosis.—Carapace elongate-ovate and streamlined in lateral view; anterior margin of left valve without denticles, of right valve with 3 to 5 short curved spines at about midheight; posteroventral margin of right valve with about 15 tiny denticles, posteriormost 5 or 6 fused together as a platelet, left valve with about 15 denticles and a

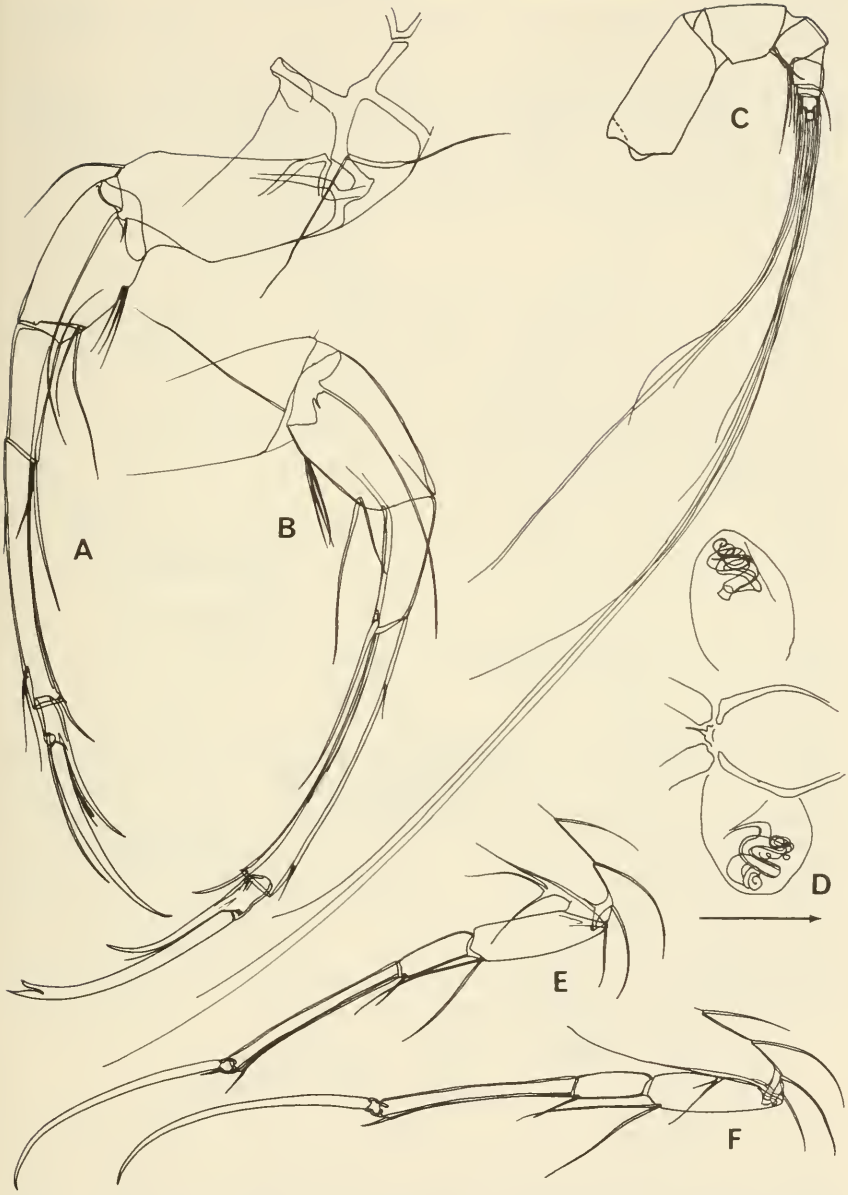


FIGURE 5.—*Neonesidea schulzi schulzi* (Hartmann): A,D, Female USNM 121253; B,E,F male USNM 121252; C, male specimen KU100025.

A,B, Antennae; C, antennule; D, genital lobe; E, second thoracic leg; F, third thoracic leg. A,B,D, × 201; E,F, × 152.

longer curved terminal spine. Hinge elements very finely crenulate, thin.

Copulatory organ of male with slender median and terminal lobes; slender lamelliform support of copulatory tube of equal thickness throughout, tube penetrating distal end of terminal lobe near tiny crescentic projection, continuing as short thread.

Material.—Nosy Bé; 445 living specimens, 293 subfossil specimens.

Single living specimens collected at Anse Royale, Ghardaqua, and *Anton Bruun* 412L. USNM 121252–121257.

Dimensions.—Adult male USNM 121252, left valve, length including spine 1.09 mm, length without spine 1.02 mm, height 0.57 mm; right valve, length 1.03 mm, height 0.52 mm.

Adult female USNM 121253, left valve, length including spine, 1.06 mm, length without spine 1.01 mm, height 0.61 mm; right valve, length 1.01 mm, height 0.57 mm.

Habitat.—Nosy Bé; the most abundant bairdian species in the epifauna of algae, grasses, sponges, corals, and dead coral fragments in coral reef and submerged platform habitats.

Subfossil distribution.—Nosy Bé; moderately common in shallow-water sands, especially near reefs.

Affinities.—The Nosy Bé specimens are identical with the Ghardaqua specimen.

Hartmann (1964), noting the minute striations on the hinge elements of this form, similar to those illustrated for *Bairdia coronata* Brady (then assigned to *Triebelina*) by van Morkhoven (1958, pl. 46: fig. 4), placed this species in *Triebelina*, as he had done earlier (1959) for the related El Salvador species *T. gierloffi* Hartmann. Such minute striations, usually too fine to be drawn accurately to scale, can be seen in several other species and genera. *Triebelina* is diagnosed by its asymmetrical and robustly ornamented carapace as well as distinctive soft-part morphology; the known species have smooth hinge elements.

Neonesidea schulzi ifalikensis, new subspecies

Figure 4*e–m*

?*Bairdia crosskeiana* Brady, Brady, 1880, p. 58, pl. 9: fig. 3a–c; 1890, p. 493.

Type specimens.—Holotype male USNM 98549 (specimen no. 466); paratype male USNM 98549 (specimen no. 465).

Type locality.—Ifalik Atoll (USNM 98549), West Caroline Islands.

Diagnosis.—Carapace virtually indistinguishable from that of *N. schulzi schulzi*. Proportions of copulatory organ foreshortened, distal lobe not visibly perforate, lamellar support of copulatory tube basally thickened and distally pointed.

FIGURE 6.—*Neonesidea schulzi schulzi* (Hartmann): A, Male specimen KU100025; B–D, male USNM 121252.

A, Maxilla; B, copulatory organ and furca; C, first thoracic leg; D, mandible. B, × 201; C, × 152; D, × 236.

Material.—From Ifalik Atoll, 14 living specimens.

Dimensions.—Adult male holotype, left valve, length 1.07 mm, height 0.57 mm; right valve, length 1.03 mm, height 0.59 mm.

Distribution.—Ifalik Atoll. Possibly identified as *B. crosskeiana* by Brady (1880) from Tonatapu, Admiralty Is., and Hawaii; (1890) from Samoa.

Affinities.—This form can be distinguished from *N. schulzi schulzi* only by inspection of the soft parts.

Neonesidea gerda (Benson and Coleman), 1964

Figure 7

Bairdia gerda Benson and Coleman, 1964, p. 19, pl. 1: figs. 14–16; fig. 8.
Bairdia cf. *B. crosskeyana* Brady, Benda and Puri, 1962, pl. 5: figs. 12, 13.

Material.—Loggerhead Key, Tortugas: 5 living specimens, in vials carrying USNM 88863, 88864, 88865, and labeled as paratypes of *Nesidea cushmani* Tressler. Carapaces are decalcified and difficult to study.

Bahamas: 3 living specimens from stations Bahamas 242 and Andros 65, from the collections of L. S. Kornicker.

Florida Bay and west coast of Florida: Abundant subfossil specimens, including holotype specimen USNM 113186, in the collections of Benson and Coleman (1964).

Dimensions.—Adult male USNM 121258 from Bahamas 242, right valve, length 0.99 mm, height 0.56 mm; left valve, length 1.02 mm, height 0.62 mm.

Adult female USNM 121259 from Andros 65, right valve, length 1.04 mm, height 0.60 mm; left valve, length 1.06 mm, height 0.65 mm.

Adult male USNM 88864 specimen 455 from Loggerhead Key, right valve, length 1.02 mm, height 0.62 mm; left valve, length 1.03 mm, height 0.65 mm.

Distribution.—Bahamas, west coast of Florida, Florida Bay, and the Florida Keys.

Affinities.—The specimens from Tortugas and Bahamas seem to be identical in soft-part characters. The copulatory organ of the Tortugas male has one or two very tiny papillae on the distal surface of the terminal segment that are not visible on the Bahamas specimen. The Tortugas shells are completely decalcified and cannot be compared accurately with others. They are, however, the same size as the Bahamas specimens. No specimens with appendages sufficiently well preserved for study could be found in the dry collections from Florida Bay and the west coast of Florida, but the subfossil carapaces of *B. gerda* resemble the Bahamas form in shape and distribution of opaque pattern, differing only in their tiny size.

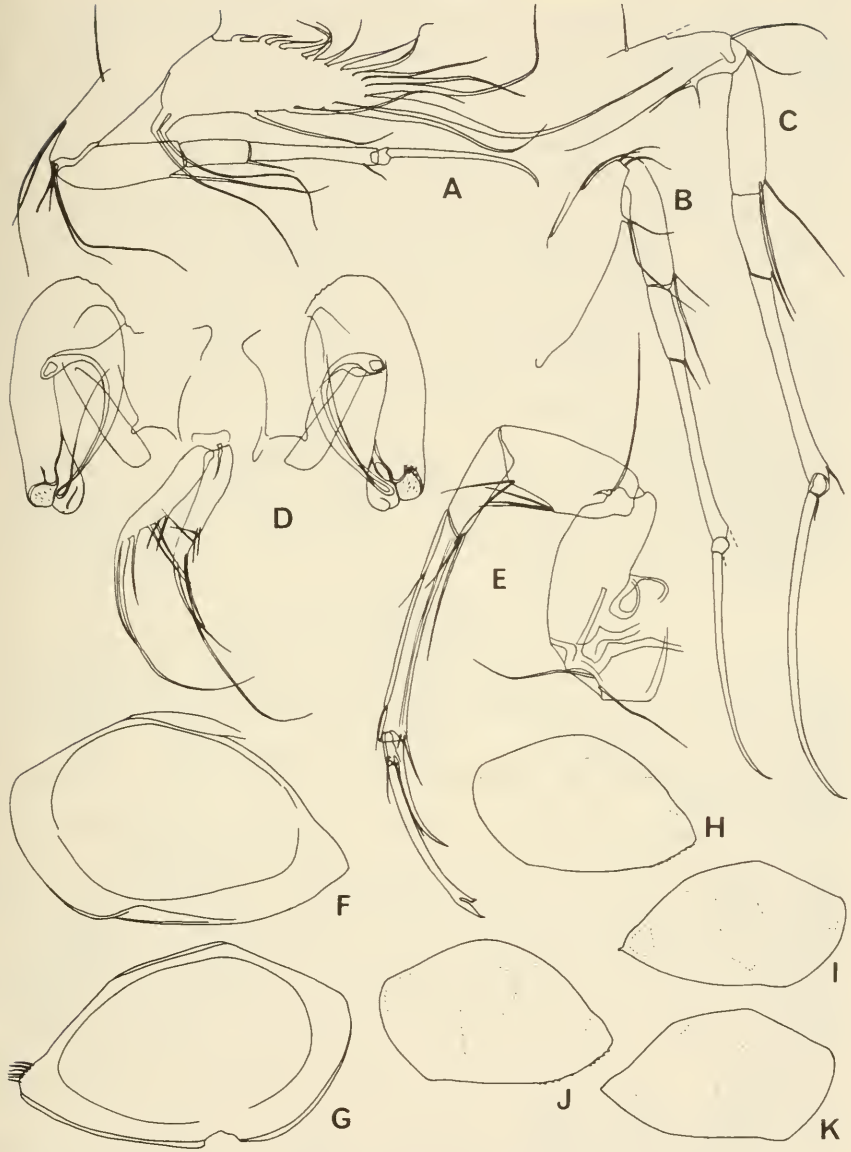


FIGURE 7.—*Neonesidea gerda* (Benson and Coleman): A–G, Male USNM 88864 specimen 455 from Tortugas; H,I, male USNM 121258 from Bimini; J,K, female USNM 121259 from Andros.

A, First thoracic leg; B, second thoracic leg; C, third thoracic leg; D, copulatory organ and furca; E, antenna; F–K, carapace exteriors seen in transmitted light. A–E, × 152; F,G, × 43; H–K, × 29.

The specimen illustrated by Benda and Puri (1962, pl. 5: figs. 12, 13) as *B.* cf. *B. crosskeyana* is undoubtedly *B. gerda.* However, the form identified as *B. crosskeyana* Brady by Puri (1960, p. 130, pl. 6, figs. 11, 12) is a distinct though related species more closely allied with such species as *N. dinochelata* and *N. parilihamata.*

Bairdia longisetosa Brady, 1902, described from St. Thomas I., is very similar to *B. gerda* in outline views, and examination of syntype or topotype material might very likely establish their synonymity. The specimen identified and illustrated by Bold (1966, p. 45, pl. 2: fig. 7a,b) as *B. longisetosa* Brady from Colon Harbor, Panama, for which both *B. crosskeyana* Brady of Puri (1960) and *B. gerda* Benson and Coleman are listed as synonyms, is more elongate and of more sinuous outline, especially in the right valve; it more closely resembles *N. gierloffi* (Hartmann).

N. gierloffi (Hartmann), 1959, described from the Pacific coast of El Salvador, has a much more elongate and sinuous carapace outline and slightly different distal outline of the male copulatory organ. It is presumably closely related.

Neonesidea antonbruuna, new species

FIGURE 8*o–r*

ETYMOLOGY.—For the Research Vessel *Anton Bruun*, whose cruises were a major part of the U.S. Program in Biology of the International Indian Ocean Expedition.

TYPE SPECIMENS.—Adult male holotype USNM 121261; paratypes USNM 121262.

TYPE LOCALITY.—*Anton Bruun* cruise 7 station 381B, near Walterson Shoal.

DIAGNOSIS.—Carapace small, elongate, and streamlined; anterior margin of right valve minutely serrate, of left valve smooth; posterior margin of right valve smooth, of left valve denticulate. Muscle-scar pattern composed of 3 rows of 2 elongate scars each and an inserted wedge of 2 scars. Copulatory organ of male with projecting rodlike distal piece.

MATERIAL.—Ten living specimens and 40 subfossil specimens at *Anton Bruun* station 381B.

DIMENSIONS.—Adult male USNM 121261, left valve, length 0.69 mm, height 0.40 mm; right valve, length 0.68 mm, height 0.35 mm.

AFFINITIES.—This is just one of a very widespread complex of forms with this general carapace shape and muscle-scar pattern.

Neonesidea cracenticlavula, new species

FIGURE 8*a–n*

ETYMOLOGY.—Latin *cracens*, slender + *clavulus*, diminutive of nail.

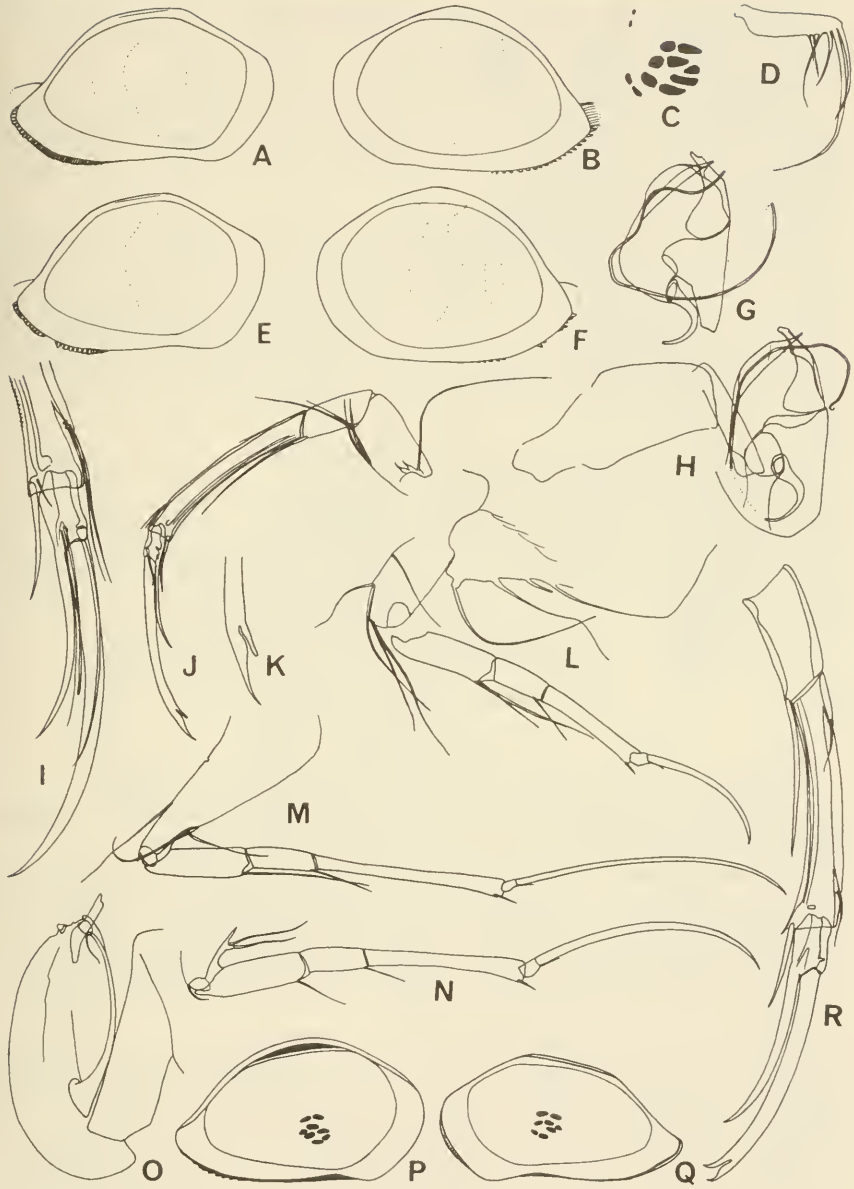


FIGURE 8.—A–N, *Neonesidea cracenticlavula*, n. sp.; O–R, *N. antonbruuna*, n. sp.: A–D,G, H,J,K, Male USNM 121263; E,F,I,L–N, female USNM 121264; O–R, male holotype, USNM 121261.

A,B,E,F, Carapace exteriors; C, muscle-scar pattern; D, furca; G,H,O, copulatory organs; I–K, R, antennae; L, first thoracic leg; M, third thoracic leg; N, second thoracic leg; P,Q, carapace interiors. A,B,E,F, × 37; D,G,H,J,L–N, × 152; I,K,O,R, × 301; P, Q, × 50.

TYPE SPECIMENS.—Adult male holotype USNM 121263; allotype female USNM 121264; paratypes USNM 121265, 121266.

TYPE LOCALITY.—*Anton Bruun* cruise 8 station 403F.

DIAGNOSIS.—Carapace highly rounded and only minimally caudate; posterior margin of right valve fringed, of left valve denticulate, enlarged terminal spine, anterior margins smooth; central and posteromedial ovate opaque areas.

Antennal claw with anterior portion of hook tapered and much the longer; thoracic legs and claws excessively long and thin; furca with only six setae, setae 1 and 4 of equal length and longer than seta 3, seta 5 shorter, seta 6 shorter still, seta 2 unfeathered; distal lobe of male copulatory organ curved subtriangular in outline, penetrated near its tip by pointed end of lamellar support for copulatory tube.

MATERIAL.—Three living specimens and 23 subfossil specimens from *Anton Bruun* stations 371G and 403F.

DIMENSIONS.—Adult male USNM 121263, left valve, length 0.95 mm, height 0.59 mm; right valve, length 0.95 mm, height 0.57 mm.

Adult female USNM 121264, left valve, length 0.94 mm, height 0.62 mm; right valve, length 0.90 mm, height 0.57 mm.

DISTRIBUTION.—Mozambique Channel near Mozambique.

Neonesidea arenigena, new species

FIGURE 9

ETYMOLOGY.—Latin *arena*, sand + *-genus*, living in.

TYPE SPECIMENS.—Adult male holotype USNM 121267; allotype female USNM 121268; paratypes USNM 121269–121270.

TYPE LOCALITY.—Nosy Bé, Madagascar, sample 166 (13°38′5″ S, 47°51′ E, depth 23 m; dredge sample near Nosy Iranja).

DIAGNOSIS.—All carapace margins smooth, exterior completely smooth, rounded subdeltoid in lateral view, muscle scars compactly grouped into 4 wedge-shaped clusters.

Both points of antennal claw bluntly rounded, anterior one slightly longer; furca with 7 setae, setae 5, 6, and 7 extremely short; copulatory organ foreshortened, terminal lobe blunt, not penetrated by copulatory tube.

MATERIAL.—Nosy Bé; 5 living specimens, 387 subfossil specimens.

DIMENSIONS.—Adult male USNM 121267, left valve, length 0.80 mm, height 0.53 mm; right valve, length 0.79 mm, height 0.44 mm.

Adult female USNM 121268, left valve, length 0.74 mm, height 0.48 mm; right valve, length 0.74 mm, height 0.36.

HABITAT.—This is the only bairdian species consistently collected living in sandy sediments around Nosy Bé (twice in shallow-water dredgings, once in sand-impregnated loose alga at low tide level).

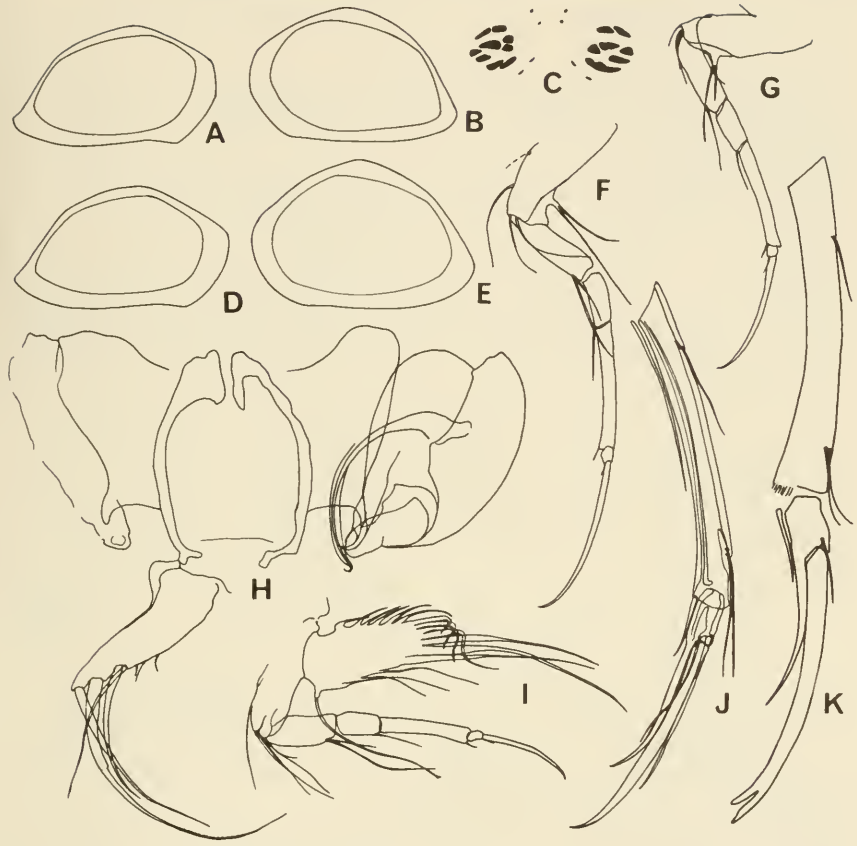


FIGURE 9.—*Neonesidea arenigena*, n. sp. A–C,F,G,I,J, female USNM 121268; D,E,H holotype male USNM 121267; K, male USNM 121269.

A, B, D, E, Carapace exteriors; C, muscle-scar pattern; F, third thoracic leg; G, second, thoracic leg; H, copulatory organ and furca; I, first thoracic leg; J, K, antennae. A,B,D, E, × 37; F, G, I, × 152; H, J, K, × 301.

SUBFOSSIL DISTRIBUTION.—Nosy Bé, present in shallow-water carbonate sands near reefs, but reaching greatest abundance in quartz-carbonate sandy muds offshore and away from reefs at depths of 10–30 m.

AFFINITIES.—The left valve lateral outline and copulatory organ are very similar to those illustrated for *N. incognita* (Lerner-Seggev): distally pointed antennal claw, a striate posteromarginal fringe on the right valve, and two very tiny proximal setae forming a total of 6 furcal setae.

327-237 O—69——3

***Neonesidea aduncicorpulenta*, new species**

FIGURE 10*b–f*

ETYMOLOGY.—Latin *aduncus*, hooked + *corpulenta*.

TYPE SPECIMENS.—Holotype male USNM 121271; paratypes USNM 121272.

TYPE LOCALITY.—In a calcareous alga at Ambatoloaka, near low tide level, sample 384; Nosy Bé, Madagascar.

DIAGNOSIS.—Denticulate left valve margins, frilled right valve margins, numerous tiny pits imparting plushy appearance to exterior, slightly concave anterodorsal and posterodorsal margins, inflated medial portion, horizontal venter. Distal antennal claw of male with

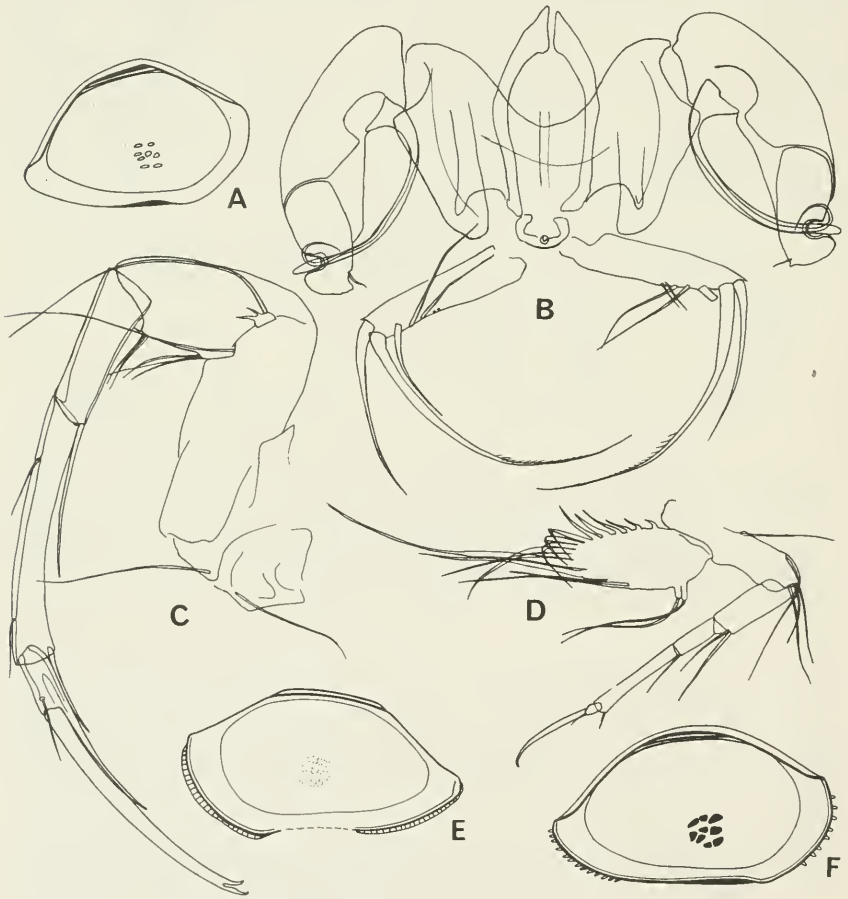


FIGURE 10.—A, *Neonesidea* sp. 2, USNM 121285; B–F, *N. aduncicorpulenta*, n. sp., male USNM 121271. A,E,F, Carapace interiors; B, copulatory organ and furca; C, antenna, D, first thoracic leg. A, × 29; B–D, × 152; E,F, × 50.

graceful slender hook; copulatory organ with distal part large and swollen, perforated by copulatory tube and carrying small dorsodistal seta.

Material.—Nosy Bé; one living male, 100 subfossil specimens.

Dimensions.—Adult male USNM 121271, left valve, length 0.80 mm, height 0.45 mm; right valve, length 0.79 mm, height 0.41 mm.

Subfossil distribution.—Fairly common in shallow carbonate sands, especially near reefs, at Nosy Bé, Madagascar.

Affinities.—The carapace of this species seems very similar to that illustrated by Müller (1894) for *Bairdia corpulenta* Müller, reported from the Bay of Naples and Marseilles regions, and it is possible that the Nosy Bé form is a subspecies of the Mediterranean species. However, Müller states that both sexes of *B. corpulenta* lack the bifid hook on the distal antennal claw and have only one ventral seta of branchial plate of first thoracic leg segregated and strengthened. These anomalous characters, combined with the different termination of the copulatory organ, suggest sufficient distinction to justify separating the Nosy Bé form as a new species.

Neonesidea parilihamata, new species

Figure 11

Etymology.—Latin *parilis*, equal + *hamatus*, hooked.

Type specimens.—Holotype adult male USNM 121273; allotype female USNM 121274; paratypes USNM 121275–121276.

Type locality.—Nosy Bé, Madagascar, sample 045 (washings of a dead coral fragment overgrown with a tunicate, three sponges, and annelid worm burrows, among patch reefs just below low tide level at Ambariobe).

Diagnosis.—Carapace small, smooth, swollen, ventrally flattened, lateral outline approaching rhomboidal, muscle-scar pattern elongated diagonally to 4 linear aggregates, inner lamella brown, posteroventral margin of left valve finely denticulate, all other margins smooth.

Distal antennal claw of male with both points of hook slender and of equal size, female with smoothly tapering claw having tiny anterior barb; distal part of copulatory organ very long, lamellar, curved, bearing a conspicuous seta distally; penetrated at midlength by pointed tip of triangular copulatory tube support.

Material.—Nosy Bé; 8 living specimens, 12 fossil specimens.

Dimensions.—Adult male USNM 121273, left valve, length 0.61 mm, height 0.36 mm; right valve length 0.60 mm, height 0.38 mm.

Adult female USNM 121274, left valve, length 0.63 mm, height 0.37 mm; right valve, length 0.62 mm, height 0.35 mm.

Habitat.—Nosy Bé; crawling on sponges, corals, and other sessile invertebrates just below low tide level at Ambariobe.

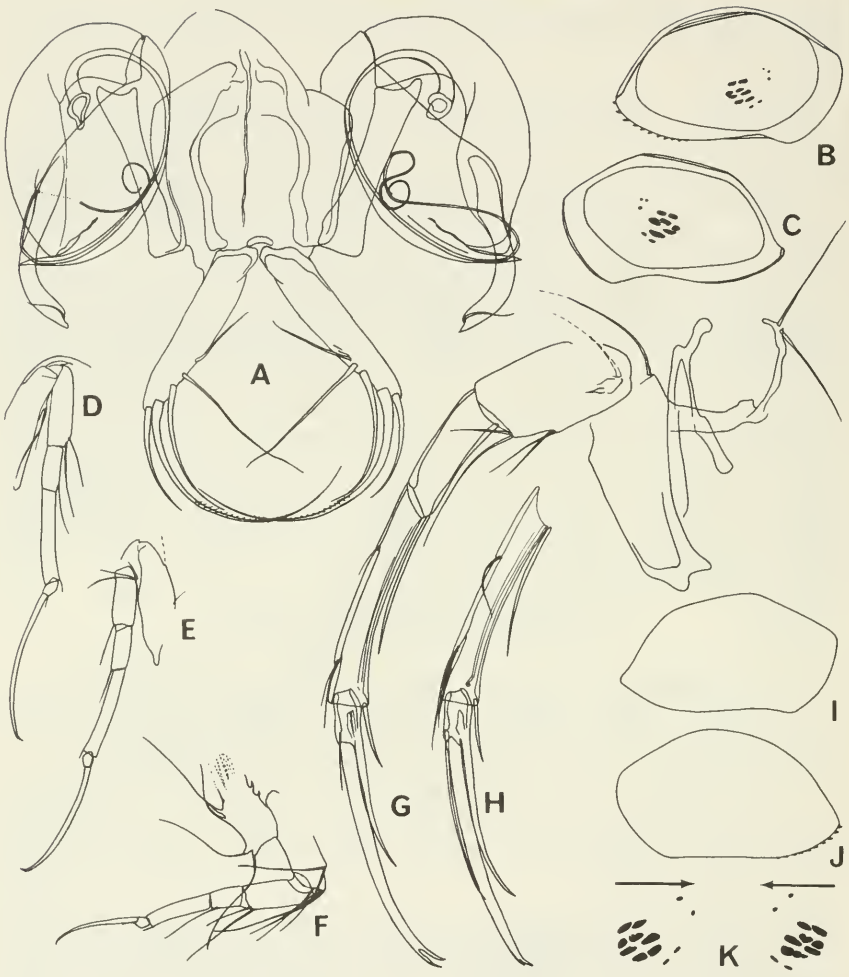


FIGURE 11.—*Neonesidea parilihamata*, n. sp.: A, D–G, Male USNM 121275; B,C,H; female USNM 121274; I–K, holotype USNM 121273.

A, Copulatory organ and furca; B, C, carapace interiors; D, third thoracic leg; E, second thoracic leg; F, first thoracic leg; G, H, antennae; I, J, carapace exteriors; K, muscle-scar pattern. A,G,H, × 301; B,C,I,J, × 50; D–F, × 75; K, × 86.

SUBFOSSIL DISTRIBUTION.—Infrequent in shallow-water carbonate sands, near coral reefs, Nosy Bé.

AFFINITIES.—This carapace form and muscle-scar pattern are characteristic also of *N. dinochelata* and *N.* species 1, whose soft parts, however, fail to confirm a close relationship.

Neonesidea dinochelata (Kornicker), 1961

FIGURE 12*f–m*

Bairdia dinochelata Kornicker, 1961, p. 65, pl. 1: fig. 4a–d; fig. 81–o.

MATERIAL.—One male and one female with dried fragmentary remains or appendages, in Bimini samples 22 and 93 of Kornicker.

DIAGNOSIS.—Carapace small, smooth, brown, highly domed with flat venter, left valve much larger than right; muscle-scar pattern much elongated diagonally, often appearing as only 4 long scars. Numerous very thin radial pore canals.

Copulatory organ with trough-like oblong bilamellar distal segment, rectangular in outline; copulatory tube moderately long and curved, not piercing distal segment, reinforced medially and distally by lobate projection of median segment; median segment bears distally a conoid projection with a short terminal seta. Furca with 7 setae, setae 5, 6, and 7 extremely short.

DIMENSIONS.—Adult male USNM 121277, left valve, length 0.82 mm, height 0.44; right valve, length 0.72 mm, height 0.39 mm.

Adult female USNM 121278, left valve, length 0.78 mm, height 0.47 mm; right valve, length 0.79 mm, height 0.44.

AFFINITIES.—This aberrant furcal type is also displayed in *N. arenigena* as well as in *Triebelina sertata*; the carapace shape and muscle-scar pattern are those of the group also containing *N. parilihamata* and *N. arenigena*.

Neonesidea species 1

FIGURE 12*a–e*

MATERIAL.—*Anton Bruun* station 412L, one living male.

DIMENSIONS.—Adult male USNM 121279, left valve, length 0.76 mm, height 0.39 mm.

AFFINITIES.—The carapace shape and muscle-scar pattern are those of the group to which *N. dinochelata* and *N. parilihamata* also belong. The copulatory tube, median distal segments of copulatory organ, and furca are very much foreshortened and of rotund proportions. Such structures are known elsewhere only in *Bairdia reticulata* Müller, 1894; a presumably unrelated form. Left valve has single terminal spine, other margins are smooth.

Neonesidea tenera (Brady), 1886

PLATE 2: FIGURE 4

Bairdia tenera Brady, 1886, p. 304, pl. 39: figs. 13–15 (probably not Brady, 1890, p. 493, pl. 1: figs. 11–12.—Chapman, 1902, p. 422).

Bairdia inornata A. Scott, 1905, p. 372, pl. 1: figs. 11, 12 (not *Bairdia inornata* T. Scott, 1894, p. 136, pl. 14: figs. 40, 41).

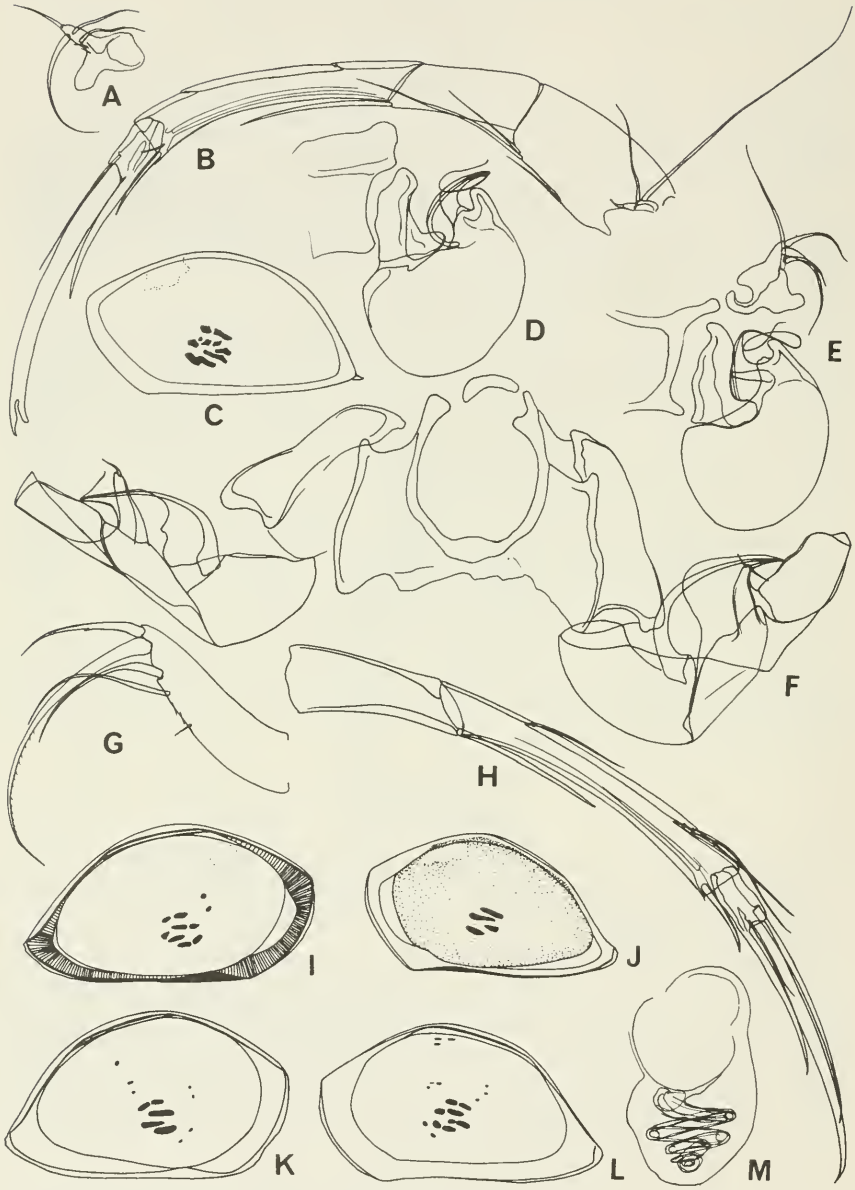


FIGURE 12.—*Neonesidea* sp. 1: A–E, Male USNM 121279. *N. dinochelata* (Kornicker) F, I, J, Male USNM 121277; G, H, K–M, female USNM 121278.

A, Furca; B, H, antennae; C, carapace exterior; D–F, copulatory organs; G, copulatory organ and furca; I–L, carapace interiors, some with radial pore canals and pigmentation; M, genital lobe. A,B,D–H,M, × 301; C,I–L, × 50.

DIAGNOSIS.—Carapace strongly compressed, with distinctly punctate exterior; posteroventral margin of left valve denticulate, others apparently smooth; anterodorsal and posterodorsal margins very slightly concave, posterior end slightly caudate.

MATERIAL.—A single subfossil carapace (USNM 121280) in intertidal sand at station LK–12, Galle, Ceylon.

DISTRIBUTION.—Described by Brady and A. Scott from Ceylon and the Gulf of Manaar; probably not the same species reported by Brady and Chapman from Samoa, Fiji, and Funafuti (= *N. pateriformis*, new species).

AFFINITIES.—*Neonesidea pateriformis*, new species, is similarly compressed but without any angles or concave segments in lateral outline, without any caudate termination.

Neonesidea pateriformis, new species

FIGURES 13–15

Bairdia tenera Brady, Brady, 1890, p. 493, pl. 1: figs. 11–12.—Chapman, 1902, p. 422.

Species BC, Maddocks, 1966, p. 47, fig. 23.

ETYMOLOGY.—Latin *patera*, saucer + *forma*, shape.

TYPE SPECIMENS.—Holotype adult male USNM 121281; allotype female USNM 121282; paratypes USNM 121283–121284, 98553 (specimen 464), 98547 (specimen 463).

TYPE LOCALITY.—Nosy Bé, Madagascar, sample 523 (washings of a green alga encrusting on rocks at low tide level at Navetsy).

DIAGNOSIS.—Carapace entirely smooth, lateral outline almost perfectly symmetrical without angles or posterior caudation, venter only very slightly sinuate. Posteroventral margins of both valves with numerous minute denticles. Color nearly uniformly dark brown centrally, margins clear.

MATERIAL.—Nosy Bé; 14 living specimens, 24 subfossil specimens.

Ifalik Atoll; 14 living specimens.

Mombasa, Kenya; single living specimens in samples LK–28 and LK–29.

HABITAT.—Nosy Bé; on algae, dead coral fragments, and other attached invertebrates and in associated sand in reef and platform environments.

DISTRIBUTION.—Nosy Bé, Ifalik Atoll, Mombasa.

Reported (as *B. tenera*) by Brady at Somoa and Fiji, and by Chapman near Funafuti.

DIMENSIONS.—Adult male USNM 121281 from Nosy Bé, left valve, length 0.79 mm, height 0.46 mm; right valve, length 0.80 mm, height 0.42 mm.

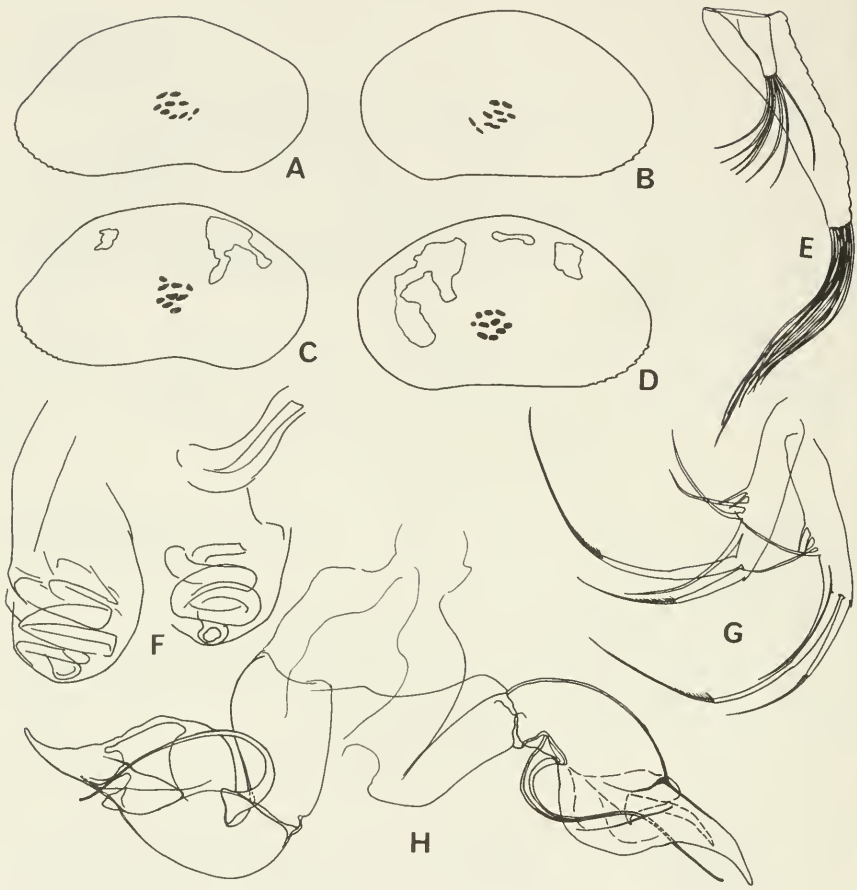


FIGURE 13.—*Neonesidea pateriformis*, n. sp. A,B,E,G,H, Male USNM 121281; C,D,F, female USNM 121282.

A–D, Carapace exteriors; E, brush-shaped structure; F, genital lobe; G, furca; H, copulatory organ. A–D, × 49; E, × 472; F–H, × 301.

Adult female USNM 121282 from Nosy Bé, left valve, length 0.79 mm, height 0.47 mm; right valve, length 0.79 mm, height 0.44 mm.

AFFINITIES.—The carapaces of the Ifalik Atoll specimens are indistinguishable from those of the Indian Ocean localities, although some minor differences are apparent in the male copulatory organs. Possibly these should be separated as subspecies.

Neonesidea species 2

FIGURE 10*a*

MATERIAL.—Nosy Bé, one female living, 205 subfossil specimens.

DIMENSIONS.—Adult female USNM 121285, left valve, length 1.04 mm, height 0.68 mm; right valve, length 1.02 mm, height 0.60 mm.

FIGURE 14.—*Neonesidea pateriformis*, n. sp. A, B, E, Male USNM 121281; C, D, female USNM 121282.

A, C, Antennae; B,D, antennules; E, mandible. A,B,E, × 301; C,D, × 127.

FIGURE 15.—*Neonesidea pateriformis*, n. sp. A–C,E,F, Male USNM 121281; D, female USNM 121282.

A, Second thoracic leg; B, third thoracic leg; C,D, first thoracic legs; E,F, maxillae. A–C, × 236; D, × 127; E, × 301; F, × 201.

HABITAT.—One specimen was collected living in a soft clay with oyster fragments at 25 m depth west of the Sambirano River delta in the Baie d'Ampasindava, near Nosy Bé, Madagascar.

SUBFOSSIL DISTRIBUTION.—Nosy Bé; common and sometimes abundant in shallow-water carbonate sands and sandy muds, particularly near reefs.

REMARKS.—The smooth, streamlined carapace with angulate lateral outline belongs to an extremely common morphologic type. The material on hand, though numerous, is not sufficiently distinctive to be diagnosed reliably.

Paranesidea, new genus

ETYMOLOGY.—Greek *para*, near + *Nesidea*.

TYPE-SPECIES.—*Paranesidea fracticorallicola*, new species.

DIAGNOSIS.—Carapace with broadly arched dorsum and more or less concave anterodorsal and posterodorsal segments, punctate; anterior and posterior margins of right valve spinose, of left valve frilled; muscle-scar pattern with eight or more subcircular scars compactly arranged rosette-fashion.

Antenna with distal claw smooth, anterodistal seta thin, fused claw serrate; vibratory plate of first thoracic leg with four unfeathered setae segregated proximally, of equal or diminishing lengths; furca with 6 setae, setae 5 and 6 very much shorter than others; copulatory organ massive, with strongly chitinized conical or digitiform distal projections, copulatory tube stout and nearly straight.

DESCRIPTION.—Carapace robust, more or less inequivalved, exterior punctate; left valve subovate in lateral outline with highly arched dorsal margin, may have slightly concave posterodorsal segment, both anterior and posterior ends broadly rounded, ventral margin straight and curving upward anteriorly and posteriorly; right valve with distinctly 3-segmented dorsal margin showing pronounced angles and more or less concave segments near the two ends, especially produced posterior end, ventral margin very slightly indented, anterior end broadly and obliquely rounded, posterior end rather caudate. Anterior and posterior margins of left valve with many small spines, of left valve with very wide but usually ragged striate frills. Hinge elements thick but simple, smooth. Muscle-scar pattern basically consisting of 8 scars in 3 horizontal to arcuate rows; individual scars are oblong to subcircular in shape and rows are closely spaced; net effect is a compact oval rosette or frequently a nearly complete circle of 7 scars surrounding interior 8th scar. Carapace of many species is basically transparent or translucent with an exceedingly complicated pattern of irregular but consistent opaque areas, each species having its own peculiar pattern.

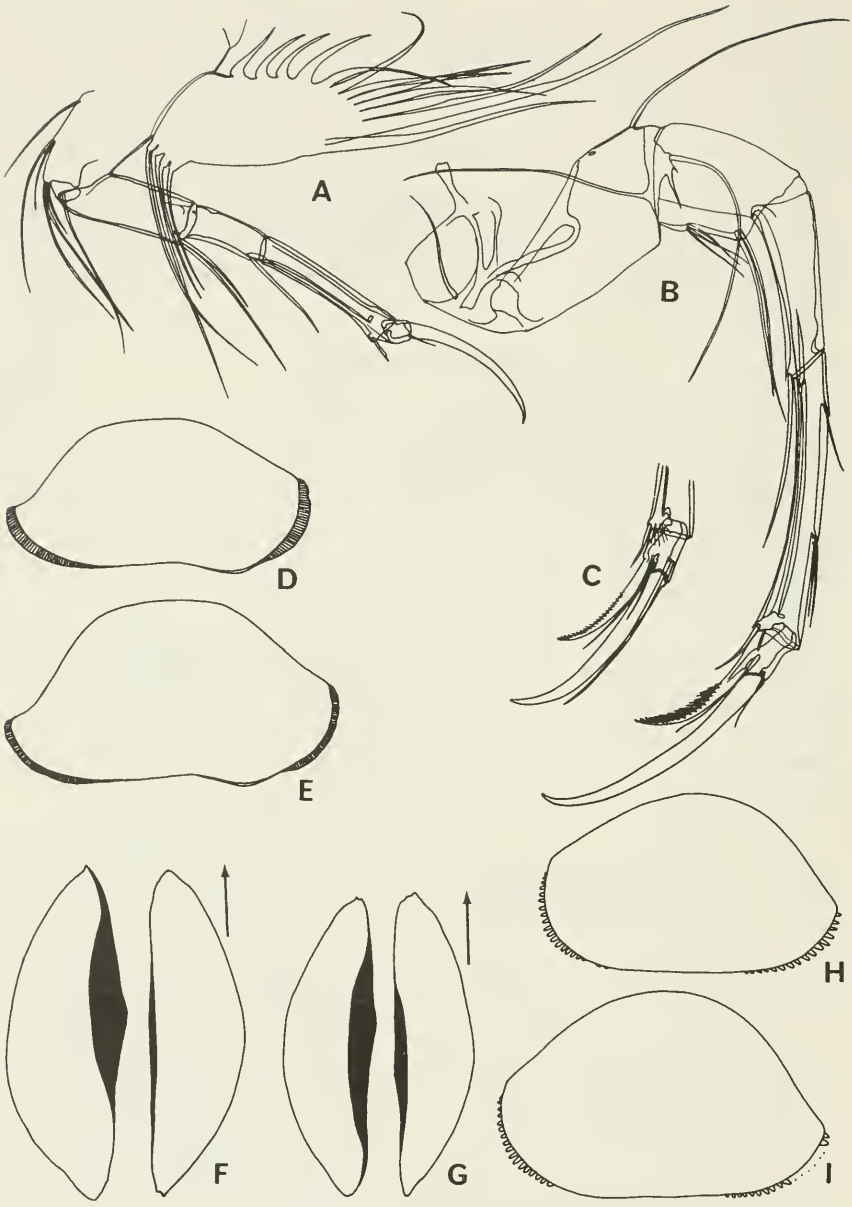


FIGURE 16.—*Paranesidea fracticorallicola*, n. sp. A,B,D,G,H, Male USNM 121287; C, female USNM 121289; E,F,I, female USNM 121288.

A, First thoracic leg; B, C, antennae; D,E,H,I, carapace exterior, lateral; F,G, dorsal. A, × 201; B, × 236; C, × 152; D–I, × 43.

Antenna quite robust, fifth podomere no more than twice as long as fourth; distal claw smooth and simply tapering in both sexes; anterodistal seta short and thin in male, long but thin in female; fused claw of sixth podomere conspicuously serrate or even pectinate in male, finely but visibly serrate in female. Vibratory plate of first thoracic leg with the four unfeathered setae segregated proximally, of equal or diminishing lengths; thoracic legs with podomere 4 no more than twice as long as podomere 5. Furca with 6 setae, setae 5 and 6 extremely tiny. Copulatory organ variable in form but generally very massive, with great hemicircular median lobe, smaller oblong or globose distal lobe, the junction between these lobes usually obscure; having one or more very strongly chitinized conical or digitiform projections, other less sharply defined swellings, and/or setae; copulatory tube rather short but stout, may be curved in sigmoid fashion or nearly straight, without long flexible continuation.

Species included.—Recent species whose soft parts have been described, listed by original binomen:

Bairdia arostrata Kornicker, 1961
Bairdia gigacantha Kornicker, 1961
Bairdia harpago Kornicker, 1961
Paranesidea algicola, new species
Paranesidea cheroconcha, new species
Paranesidea fracticorallicola, new species
Paranesidea spongicola, new species

Ecology.—This, the second most abundant group of "*Bairdia*" species, is abundantly represented in tropical faunas. These species are characteristic of very shallow water, chiefly inhabiting the surfaces of algae, sponges, corals, coralline detritus, and associated marine organisms on coral reefs and in nearby inner sublittoral environments. They are apparently absent from intertidal and other variably saline conditions. The two abyssal species assigned below to *Paranesidea* do not conform to this genus in either morphology or ecology and would better be relegated to a new genus.

Distribution.—Of bairdian species whose soft parts are known, only those described by Kornicker (1961) from the Bahamas can definitely be assigned to *Paranesidea*.

Affinities.—The carapace and appendage anatomy of this group is essentially continuous with that of *Triebelina*, and it is, in fact, difficult to know how or where to define a boundary between the two genera on appendage criteria alone. In part this difficulty arises from the lack of described male specimens of *Triebelina*. The rough texture and subquadrate carapace outline of *Triebelina* represent extreme development of the tendency toward robust punctate carapace in *Paranesidea*.

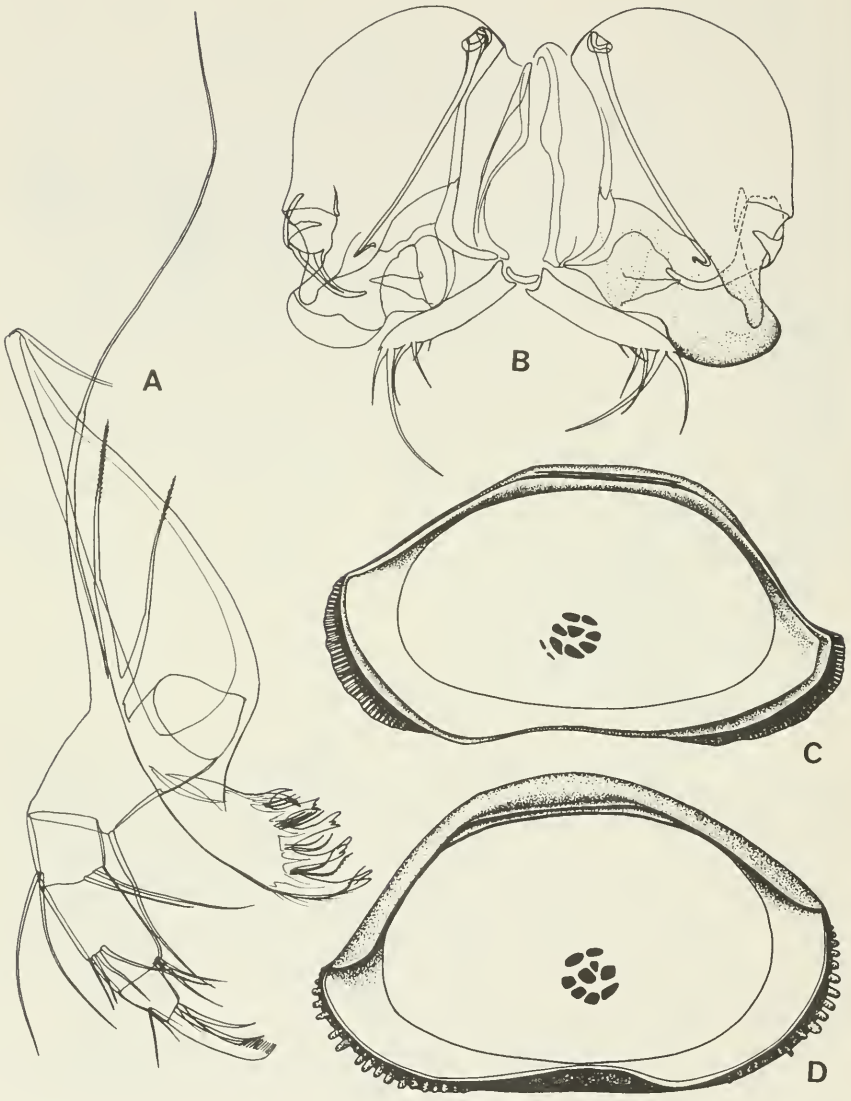


FIGURE 17.—*Paranesidea fracticorallicola*, n. sp.:A,B, Male USNM 121287; C,D, male USNM 121290.

A, Mandible, × 301; B, copulatory organ and furca, × 201; C,D, carapace interiors, × 75.

Two species from the abyssal fauna, *P. albatrossa*, new species, and *P.* species 1, assigned below to *Paranesidea*, conform superficially to the diagnosis of this genus in carapace shape, muscle-scar pattern, and what is known of their appendage anatomy. However, their very large and robust carapaces, entirely without any patterned differenti-

ation into transparent and opaque areas, and their subdivided muscle scars, sometimes rather macrocypridid in aspect, when combined with their very different ecologic requirements, present a rather alien aspect. When better material is available, it is certain that they will be more comfortably accommodated in a separate genus.

***Paranesidea fracticorallicola*, new species**

FIGURES 16–18; PLATE 1: FIGURES 5, 6

ETYMOLOGY.—Latin *fractus*, broken+*corallum*, coral+*-cola*, dweller.

TYPE SPECIMENS.—Adult male holotype USNM 121287; allotype USNM 121288; paratypes USNM 121289–121293.

TYPE LOCALITY.—Nosy Bé, Madagascar, sample 196 (washings of *Enteromorpha*-like alga at low tide level of the beach at Ambariobe).

DIAGNOSIS.—Carapace robust, inflated, left valve in lateral view with broadly arched dorsal margin, greatest height located slightly behind midlength, greatest thickness located near venter, surface very gently pitted.

Copulatory organ with median and terminal lobes inseparable, apparently fused; with stout curved conical process arising laterally at their junction; terminal lobe smooth, pigmented, and mushroom-shaped distally; copulatory tube thin and straight, ending in short loop.

MATERIAL.—Nosy Bé; 48 living specimens, 400 subfossil specimens. *Anton Bruun* station 412C, one living male.

HABITAT.—Nosy Bé; moderately common on calcareous and non-calcareous algae and accumulations of dead coral fragments near low tide level on the back-reef platform and lower beach.

SUBFOSSIL DISTRIBUTION.—Nosy Bé; abundantly distributed in sands and sandy muds from beaches, reefs, and offshore depths to 30 m.

DIMENSIONS.—Adult male USNM 121287, left valve, length 0.92 mm, height 0.54 mm; right valve, length 0.92 mm, height 0.46 mm.

Adult female USNM 121288, left valve, length 1.02 mm, height 0.62 mm; right valve, length 1.02 mm, height 0.56 mm.

***Paranesidea harpago* (Kornicker), 1961**

FIGURE 19

Bairdia harpago Kornicker, 1961, p. 63, pl. 1: fig. 1a–b; fig. 7A–J.

MATERIAL.—Three living and recently dead adult males from Bahamas samples 132, 201, and Andros 110; 4 adult females.

DISTRIBUTION.—Bahamas.

DIMENSIONS.—Adult male USNM 121294, left valve, length 1.07 mm, height 0.74 mm; right valve, length 1.05 mm, height 0.64 mm.

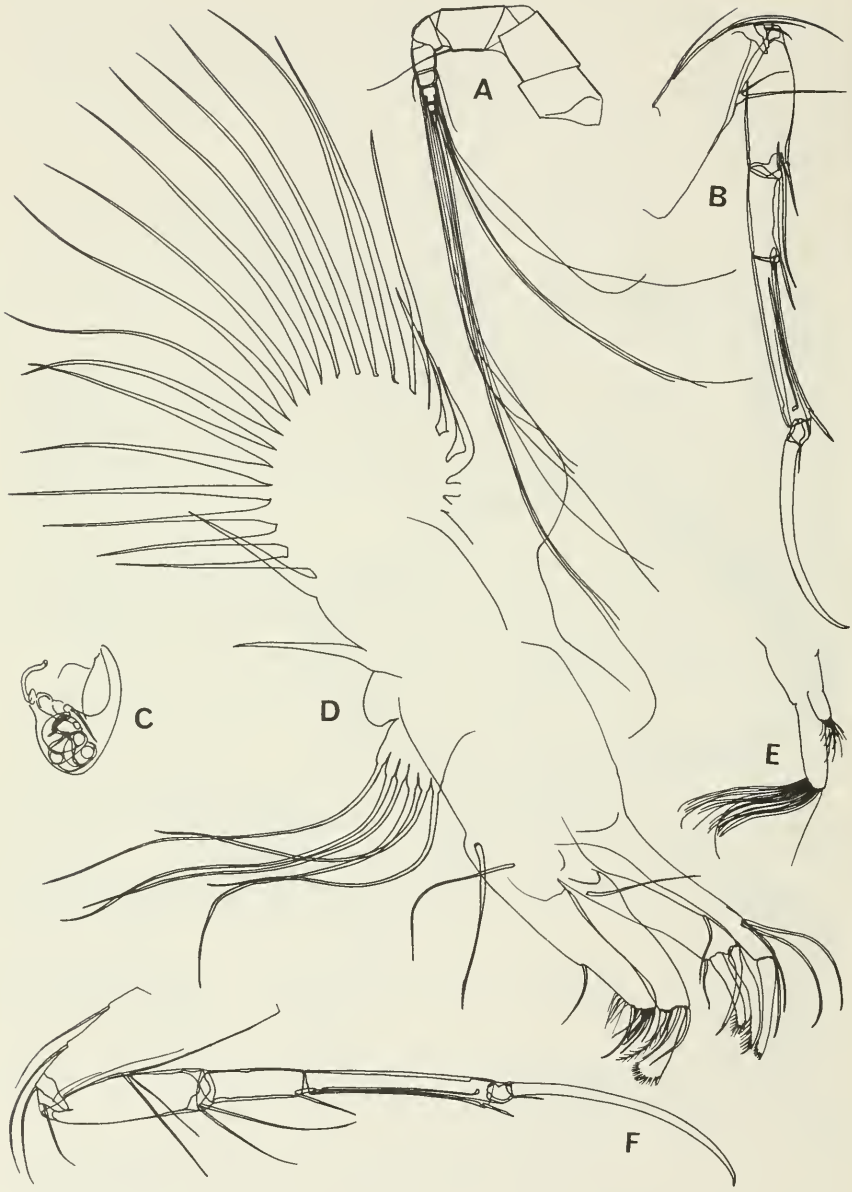
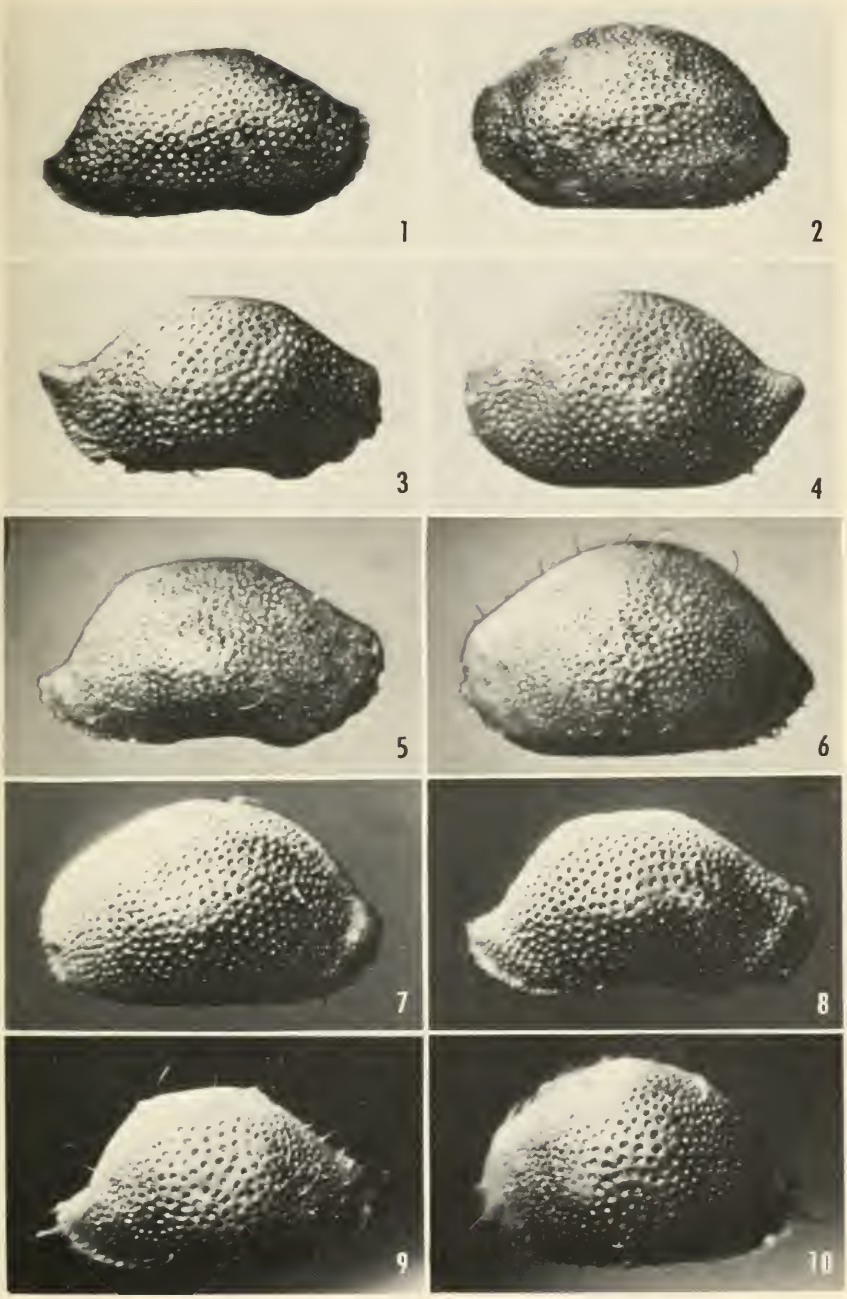
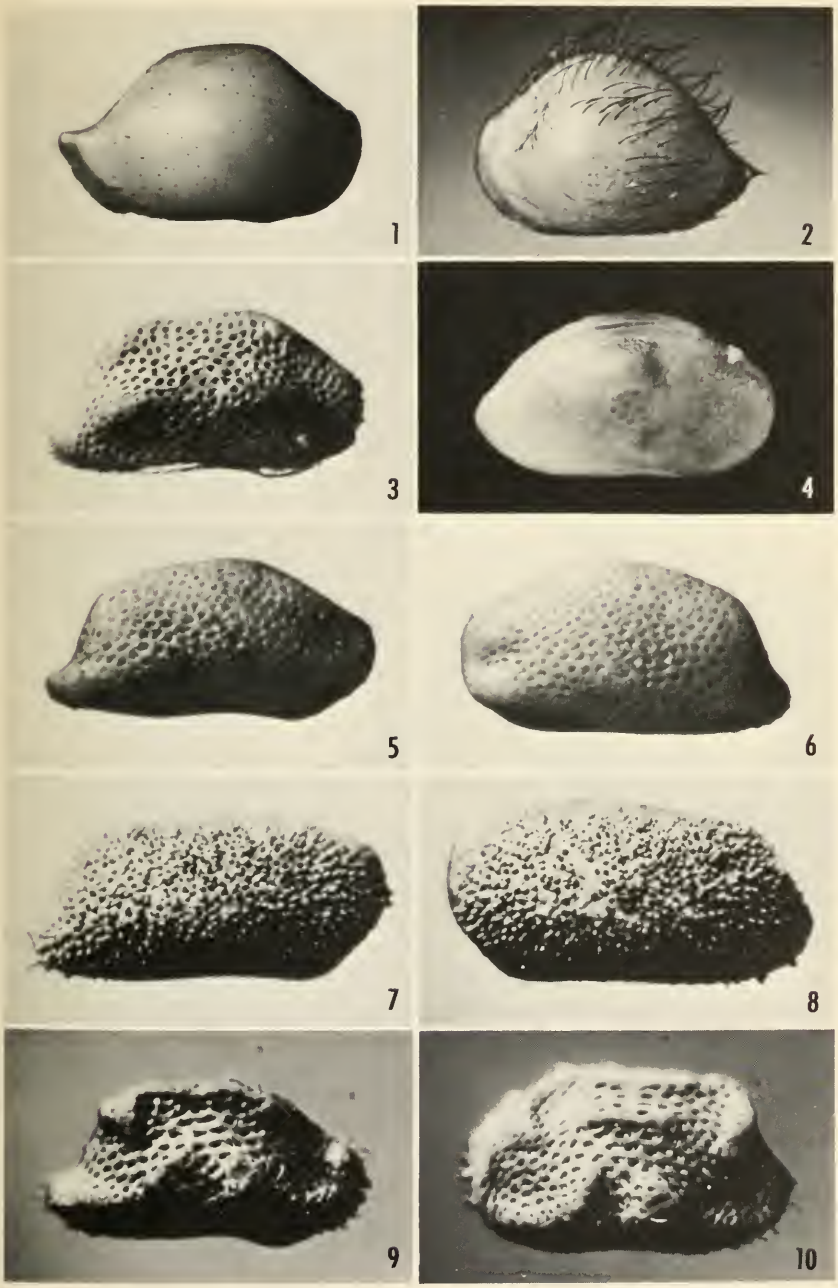


FIGURE 18.—*Paranesidea fracticorallicola*, n. sp.: A,E, Male USNM 121291; B,D,F, male USNM 121 287; C, female USNM 121289.

A, Antennule; B, second thoracic leg; C, genital lobe; D, maxilla; E, brush-shaped organ; F, third thoracic leg. A,E, × 127; B,F, × 201; C, × 152; D, × 301.



FIGURES 1, 2, *Paranesidea* species 3, USNM 121321; 3, 4, *Paranesidea* species 4, USNM 121323, USNM 121322; 5, 6, *Paranesidea fracticorallicola*, new species, USNM 121291; 7, 8, *Paranesidea algicola*, new species, USNM 121299; 9, 10, *Paranesidea spongicola*, new species, USNM 121302.



FIGURES 1, 2, *Bairdoppilata* (*Bairdoppilata?*) *hirsuta* (Brady), USNM 121355; 3, *Triebelina bradyi* Triebel, USNM 121325; 4, *Neonesidea tenera* (Brady), USNM 121280; 5, 6, *Triebelina reticulopuncta* Benson, USNM 113123; 7, 8, *Triebelina schyroconcha*, new species, USNM 121322, USNM 121331; 9, 10, *Triebelina sertata* Triebel, USNM 121328.

FIGURE 19.—*Paranesidea harpago* (Kornicker), male USMN 121294.
A,B, Carapace interiors; C, copulatory organ and furca; D, third thoracic leg; E, second thoracic leg; F, antenna: G, first thoracic leg. A,B, × 29; C–G, × 152.

Paranesidea gigacantha (Kornicker), 1961

FIGURE 20

Bairdia gigacantha Kornicker, 1961, p. 62, pl. 1: fig. 2a–c; figs. 6A–J, 10A, D.
Bairdia victrix Brady of Benson and Coleman, 1964, p. 17, pl. 2: figs. 4–10; fig. 6.

MATERIAL.—One male recently dead and several females in Bahamas sample 132. Two females recently dead in Florida Bay sample 23.

DISTRIBUTION.—Bahamas, Florida Bay.

DIMENSIONS.—Adult male USNM 121296, left valve, length 0.90 mm, height 0.57 mm; right valve, length 0.88 mm, height 0.52 mm.

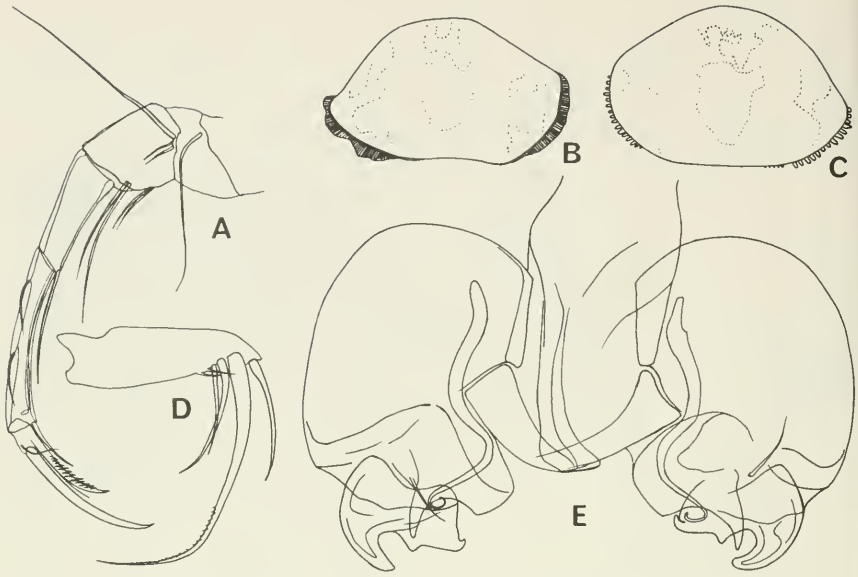


FIGURE 20.—*Paranesidea gigacantha* (Kornicker), male USNM 121296.
A, Antenna; B,C, carapace exteriors; D, furca; E, copulatory organ. A,D, × 152; B,C, × 37; E, × 301.

AFFINITIES.—The females of the Florida Bay assemblage are considerably larger than those from the Bahamas but have very similar shape, marginal denticulation, and opaque pattern. "*Bairdia*" *victrix* Brady, 1869, is more produced at anterior and posterior ends.

Paranesidea arostrata (Kornicker)

FIGURE 21

Bairdia arostrata Kornicker, 1961, p. 65, pl. 1: fig. 3a–b; 8A–H.

MATERIAL.—Paratype male specimen 122C–1 from Bahamas.

DISTRIBUTION.—Bahamas.

AFFINITIES.—No other species has been described with a copulatory organ having a bifurcate and otherwise structureless terminal lobe. However, its median lobe and sigmoid copulatory tube are typical of *Paranesidea*, as are the other appendage characters and the carapace.

Paranesidea algicola, new species

FIGURES 22–24; PLATE 1: FIGURES 7, 8

ETYMOLOGY.—Latin *alga*, seaweed + *cola*, dweller.

TYPE SPECIMENS.—Holotype male USNM 121299; allotype female USNM 121300; paratypes USNM 121301.

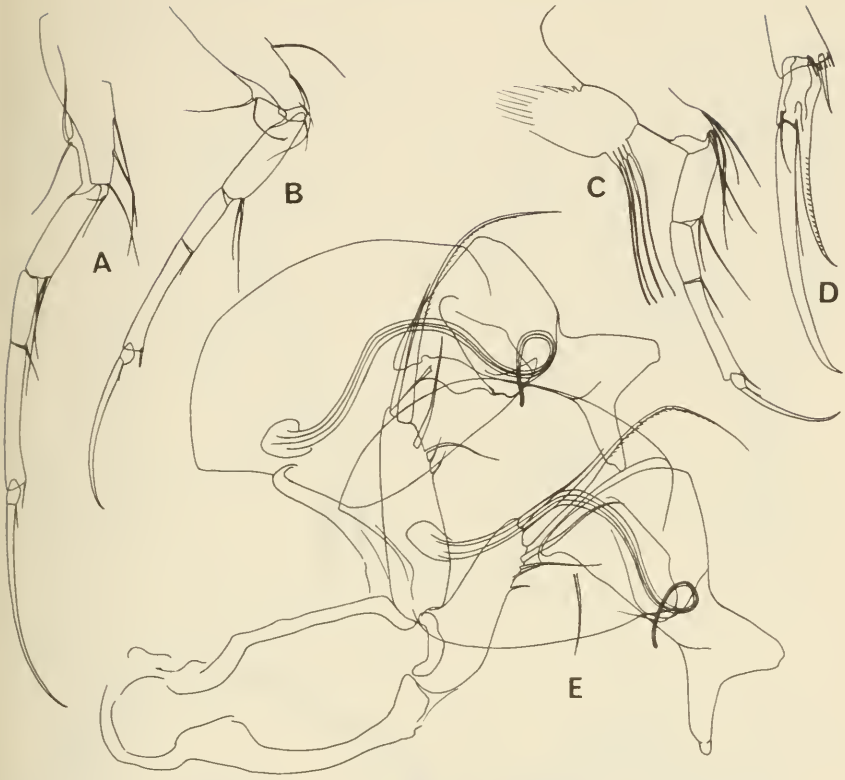


FIGURE 21.—*Paranesidea arostrata* (Kornicker), paratype male specimen 122C–1. A, Third thoracic leg; B, second thoracic leg; C, first thoracic leg; D, antennal claws; E, copulatory organ and furca. A–C, × 152; D,E, × 301.

TYPE LOCALITY.—Nosy Bé, Madagascar, sample 446 (washings of a green alga at low tide level of the beach at Antsakoabe).

DIAGNOSIS.—Carapace rather compressed and especially so marginally, with the break in slope between marginal and medial surface areas visible as a subtly sulcate shadow, greatest height located slightly behind midlength, greatest thickness median, posterior end slightly caudate.

Copulatory organ with oblong median lobe, subquadrangular terminal lobe bearing ventrodistal finger-like projection; copulatory tube curved in shallow sigmoid fashion, apparently penetrating distal lobe.

MATERIAL.—Nosy Bé; 59 living specimens, 116 subfossil specimens.

HABITAT.—Nosy Bé; common on many varieties of calcareous and noncalcareous algae near low tide level on the back-reef platform, also on coralline detritus.

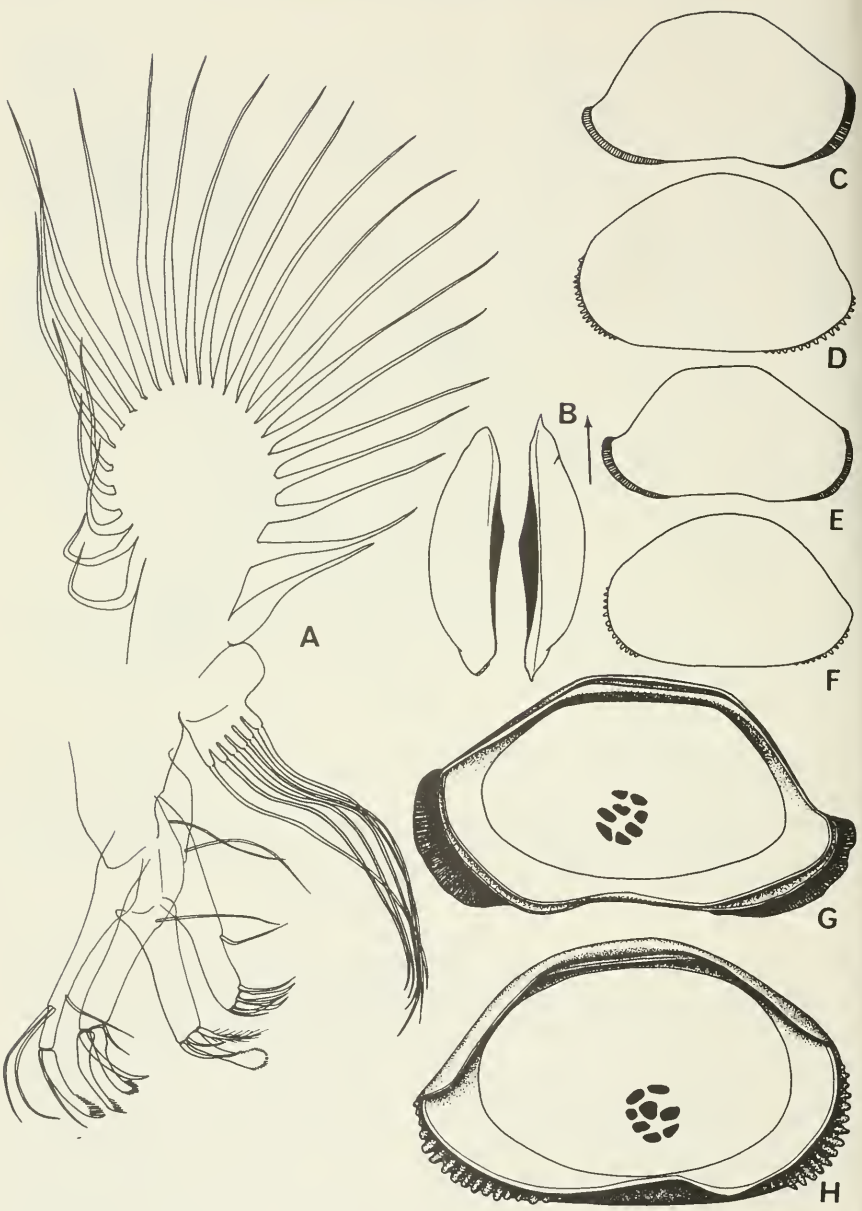


FIGURE 22.—*Paranesidea algicola*, n. sp.: A,C,D, Female USNM 121300; B,E–H, male USNM 121299.

A, Maxilla, × 301; B, carapace dorsal view, × 43; C,F, carapace exteriors, × 43; G,H, carapace interiors, × 75.

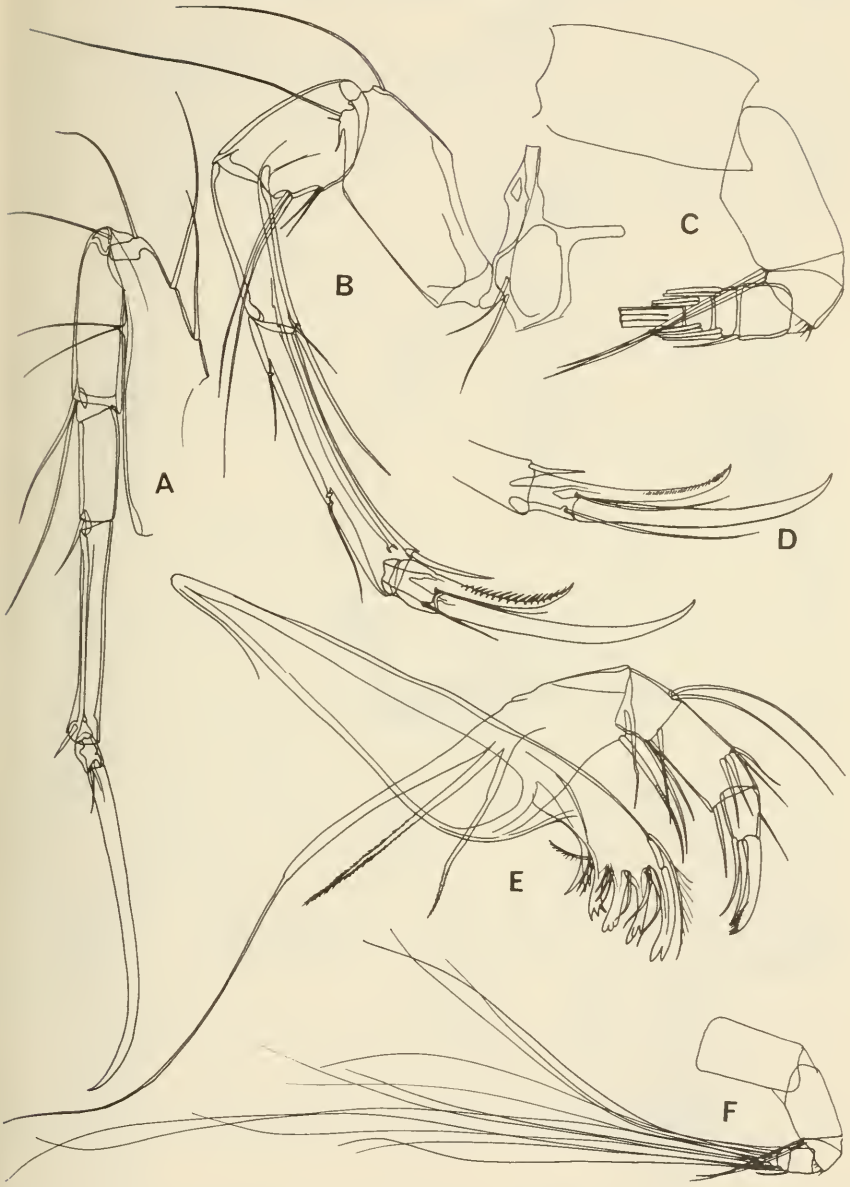


FIGURE 23.—*Paranesidea algicola*, n. sp.: A–C,F, Male USNM 121299; D,E, female USNM 121300.

A, Third thoracic leg: B,D, antennae; C,F, antennules; E, mandible. A–E, × 301; F, × 152.

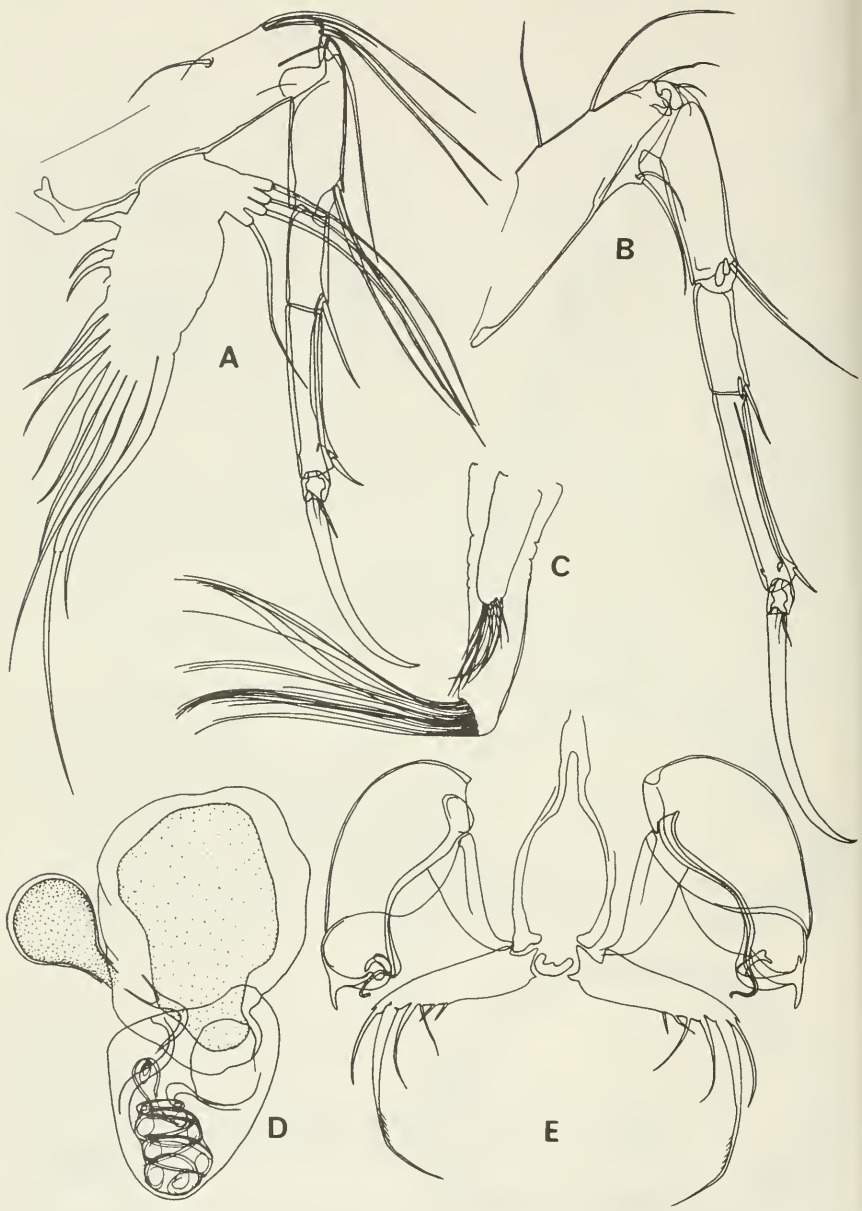


FIGURE 24.—*Paranesidea algicola*, n. sp.: A–C,E, Male USNM 121299; D, female USNM 121300.

A, First thoracic leg; B, second thoracic leg; C, brush-shaped organ; D, genital lobe; E, copulatory organ and furca. All × 301.

Subfossil distribution.—Nosy Bé, moderately common in carbonate beach, reef, and platform sands.

Dimensions.—Adult male USNM 121299, left valve, length 0.75 mm, height 0.46 mm; right valve, length 0.76 mm, height 0.40 mm.

Adult female USNM 121300, left valve, length 0.86 mm, height 0.53 mm; right valve, length 0.83 mm, height 0.42 mm.

***Paranesidea spongicola*, new species**

Figures 25–26; Plate 1: figures 9, 10

Etymology.—Latin *spongia*, sponge + *-cola*, dweller.

Type specimens.—Adult male holotype USNM 121302; allotype USNM 121303; paratypes USNM 121304–121305.

Type locality.—Washings of dead coral and shell fragments from coral patch reef talus at Pointe Lokobe, Nosy Bé, Madagascar (sample 373).

Diagnosis.—Carapace with highly arched dorsum, left valve approximately symmetrical in lateral view, greatest height located midlength, greatest thickness located at midheight, exterior abundantly covered with distinct circular pits, largest in median area.

Copulatory organ with simple lobate terminal part bearing 1 or 2 vestigial projections, copulatory tube strong and gently arched.

Material.—Nosy Bé, 17 living specimens 433 subfossil specimens.

Comores: one male living at LK–39, Mayotte I.

Habitat.—Nosy Bé, sporadically encountered in a great variety of shallow-water epifaunal niches, crawling on algae, dead coral fragments, living corals and sponges, in the reef and back-reef zones.

Subfossil distribution.—Nosy Bé, abundant and nearly ubiquitous in shallow-water sediments, especially reef-derived sands.

Dimensions.—Adult male specimen USNM 121302, left valve, length 0.82 mm, height 0.54 mm; right valve, length 0.81 mm, height, 0.48 mm.

Adult female USNM 121303, left valve, length 0.91 mm, height 0.63 mm; right valve, length 0.87 mm, height 0.53 mm.

Affinities.—This is an extremely common morphologic type, and forms with similar carapaces are found in most shallow-water tropical assemblages.

***Paranesidea ? cheroconcha*, new species**

Figure 27*c*, *d*, *i*

Etymology.—Greek *cher*, hedgehog+*konche*, shell.

Type specimens.—Holotype adult female specimen USNM 121306; paratypes USNM 121307–121308.

Type locality.—*Anton Brunn* cruise 7 station 372P.

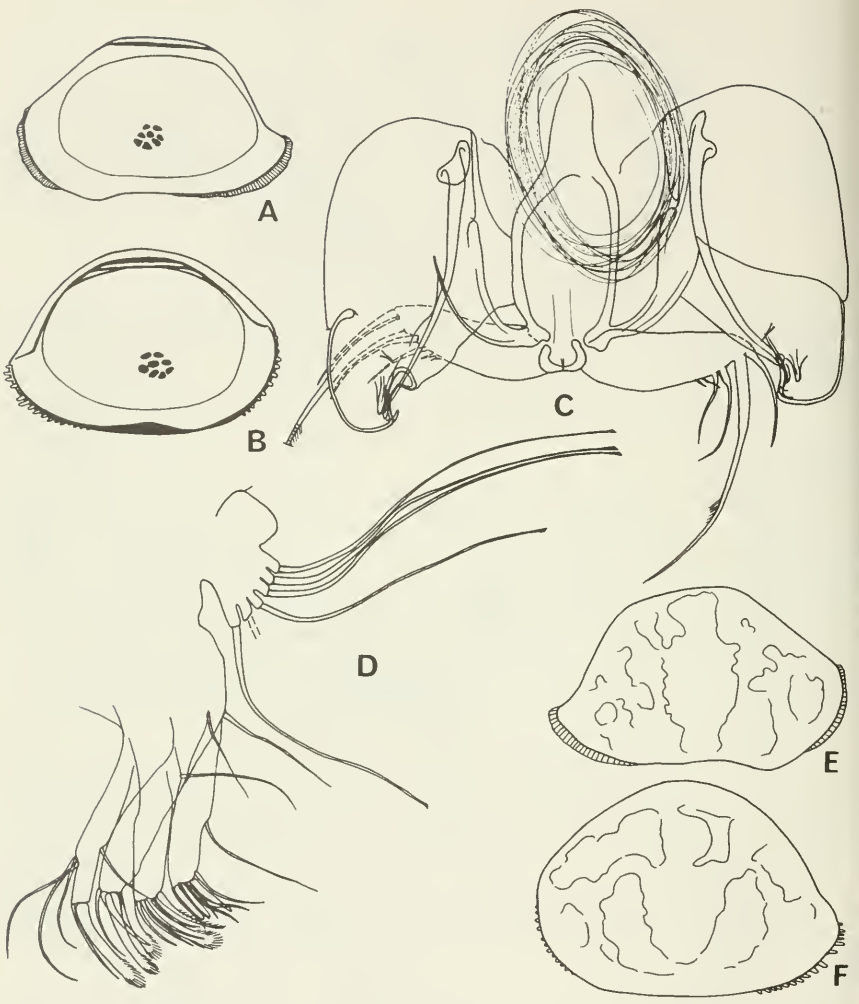


FIGURE 25.—*Paranesidea spongicola*, n. sp.: A–D, Male USNM 121302; E,F, female USNM 121303.

A,B, Carapace interiors; C, copulatory organ and furca; D, maxilla; E,F, carapace exteriors. A,B,E,F, × 43; C,D, × 301.

DIAGNOSIS.—Carapace exterior with abundant fine pits and bearing rather numerous small spines, these located mainly in anterior, posterior, and ventral regions and absent from the dorsomedian and median areas. Posterior siphonate indentation of selvage very conspicuous on both valves. Anterior and posterior margins of both valves with striate frill. Muscle-scar pattern as usual for the genus; anterior to adductor scars is a conspicuous raised crescentic projection similar to the fulcral point found in some Cytheraceans.

FIGURE 26.—*Paranesidea spongicola*, n. sp., male USNM 121302.

A, Third thoracic leg; B, second thoracic leg; C, first thoracic leg; D, mandible; E, antenna; F, antennule. A–C, × 201; D, × 301; E, × 236; F, × 127.

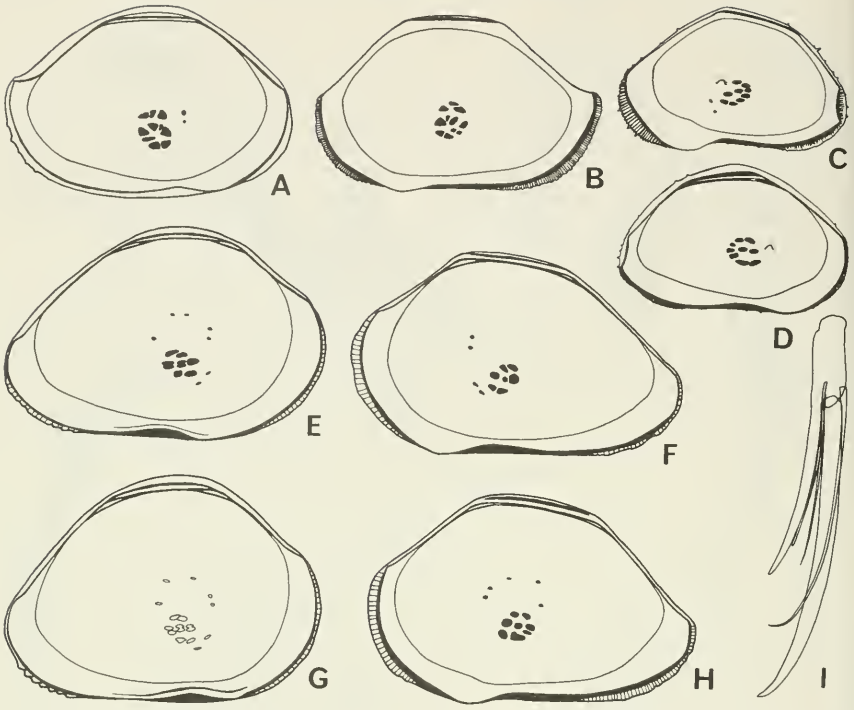


FIGURE 27.—*Paranesidea* sp. 1: A, USNM 121315; B, USNM 121316. *Paranesidea ? cheroconcha*, n. sp.: C,D,I, female USNM 121306. *B.* (*Bairdoppilata?*) sp. 3: E, USNM 121362; F, USNM 121360; G, USNM 121361; H, USNM 121359.
A–H, Carapace interiors, × 29; I, distal antennal claws, × 301.

Fused claw of fifth antennal podomere not serrate.

MATERIAL.—Two recently dead females from *Anton Bruun* station 372P and one from 403F. The dried appendages are fragmentary and yield little information.

DIMENSIONS.—Adult female specimen USNM 121306, left valve, length 1.03 mm, height 0.67 mm; right valve, length 1.04 mm, height 0.65 mm.

AFFINITIES.—The single specimen from *Anton Bruun* 403F is much less abundantly tuberculate, having spines distributed only near the free margins. The raised fulcral point is a structure not yet seen in any other species of Bairdiidae.

***Paranesidea ?albatrossa*, new species**

FIGURE 28*j–m*

ETYMOLOGY.—For the U.S. Fisheries Steamer *Albatross*, whose worldwide sediment collections have contributed valuable assemblages of abyssal ostracodes.

TYPE SPECIMENS.—Holotype specimen USNM 121309; paratypes USNM 121310–121314.

TYPE LOCALITY.—*Albatross* station 2751.

DIAGNOSIS.—Surface smooth with widely spaced tiny normal pore canal pits. Left valve rounded subtriangular in lateral view, right valve more nearly trapezoidal. Well preserved specimens have tiny marginal denticles on both valves, most specimens are more or less abraded with smooth margins. Typical form with dorsal rows of adductor muscle-scar pattern divided into 3 scars each and separated by a gap; ventral scars also tend toward further subdivision.

MATERIAL.—One female living at USNM, Acc. No. 271766; 319 subfossil specimens at *Albatross* stations 2385, 2392, 2751, 2808, 3376, and at *Anton Bruun* stations 360B, 363G,J,K, 367D, 368C, 369G, J, 397D, 400B, 407.

DIMENSIONS.—Left valve specimen USNM 121310, length 1.39 mm, height 0.98 mm.

Right valve specimen USNM 121311, length 1.48 mm, height 0.98 mm.

Left valve specimen USNM 121309, length 1.40 mm, height 0.90 mm.

Right valve specimen USNM 121312, length 1.40 mm, height 0.87 mm.

AFFINITIES.—While it may seem improbable that so widespread a form should not have been described previously, I cannot find any illustrated species with which to identify it. I suspect that specimens of this form might have been recorded as *Bairdia victrix* Brady by Brady (1880), Chapman (1910), and Tressler (1954), but cannot prove this.

Bairdia subcircinata Brady and Norman, described from the North Atlantic and (as *B. formosa* Brady) from various *Challenger* dredgings, is relatively higher in lateral view and has tiny spinose tubercles on the lateral surface.

Bairdia subdeltoidea conformis Terquem of Colalongo (1965), described from the Plio-Pleistocene of Calabria, has smooth margins on both valves and a more upturned posterior angle in left valve, also apparently has denticulate hingement.

Mozambique Channel specimens are generally higher in proportion to length and display a conspicuously different muscle-scar arrangement (Figure 28*l*, *m*); however, there exists such a diversity of form in this population that some specimens cannot be distinguished reliably from the western population. For the time being, the populations from the Gulf of Mexico, Pacific, and Mozambique Channel are identified with the Caribbean species.

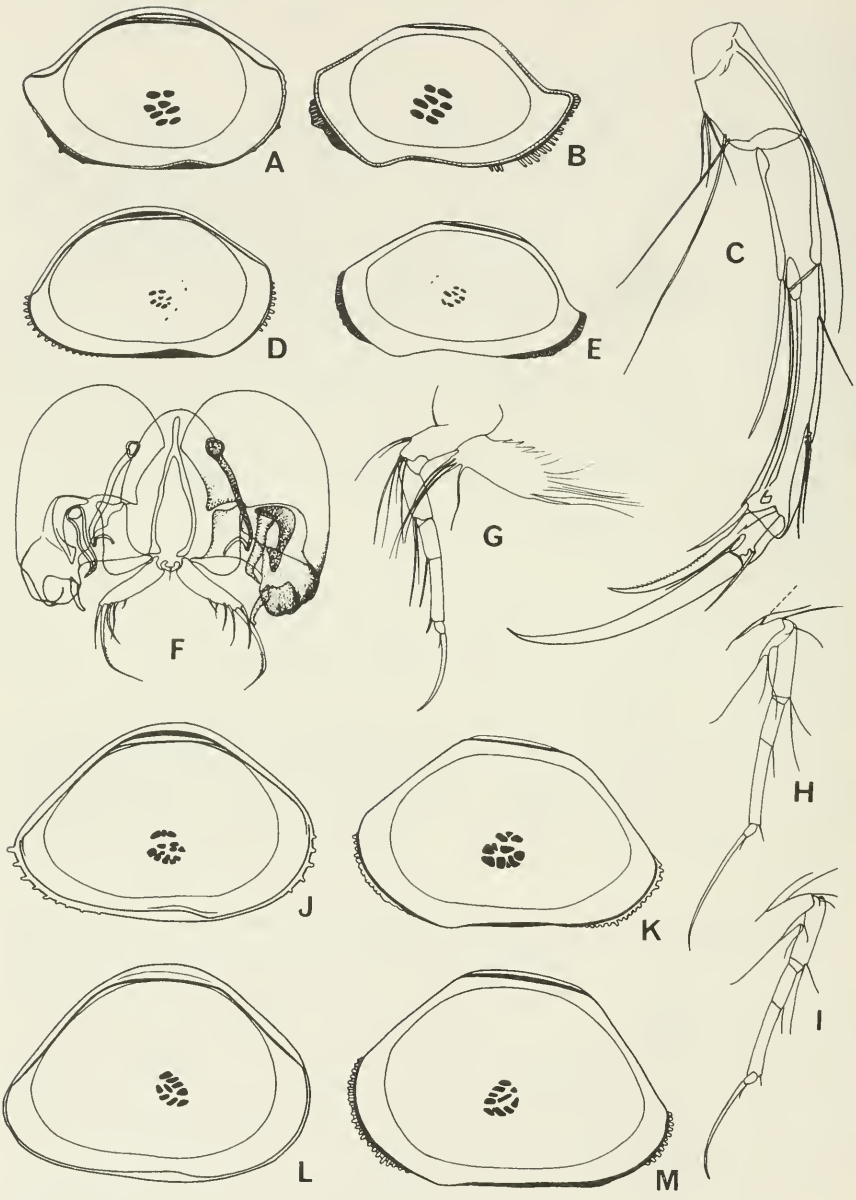


FIGURE 28.—*Paranesidea* sp. 4: A, USNM 121322; B, USNM 121323. *P.* sp. 3: C–I, male USNM 121321. *P. ? albatrossa*, n. sp.: J, USNM 121309; K, USNM 121312; L, USNM 121310; M, USNM 121311.

A,B,D,E,J–M, Carapace interiors; C, antenna; F, copulatory organ and furca; G, first thoracic leg; H, third thoracic leg; I, second thoracic leg. A–D, × 29; E,G, ×152; F, H,I, × 127; J–M, × 29.

The more complex muscle-scar divisions, lack of differentiated opaque pattern, and huge size suggest that this species or species complex should be removed to a new genus. Until better preserved material can be studied, this form is temporarily assigned to *Paranesidea*.

***Paranesidea*? species 1**

FIGURE 27*a*, *b*

MATERIAL.—From *Anton Bruun* stations 380A, C, 160 subfossil specimens.

DISTRIBUTION.—Walterson Shoal, depths 935 and 950 m.

DIMENSIONS.—Specimen USNM 121315, left valve, length 1.31 mm, height 0.86 mm.

Specimen USNM 121316, right valve, length 1.29 mm, height 0.78 mm.

REMARKS.—This form is characterized by considerable ventral inflation, nearly symmetrical lateral outlines with caudate posterior, broadly arched dorsal margin in left valve, denticulate margins, and smooth exterior with tiny normal pore canal pits. The two top rows of the adductor muscle-scar pattern are divided into 3 scars rather than two and separated somewhat; the resulting configuration has a rather macrocypridid aspect. For this and other reasons summarized above, this form should be assigned with *P.* ? *albatrossa*, new species, to a new genus rather than *Paranesidea*.

***Paranesidea* species 2**

FIGURE 29

MATERIAL.—Two adult males and one female recently dead at *Anton Bruun* station 421A.

DISTRIBUTION.—Near Mombasa, Kenya; depth 34 m.

DIMENSIONS.—Adult male specimen USNM 121318, left valve, length 0.90 mm, height 0.61 mm; right valve, length 0.90 mm, height 0.55 mm.

Adult female specimen USNM 121319, left valve, length 0.85 mm, height 0.55 mm; right valve, length 0.85 mm, height 0.54 mm.

REMARKS.—Conspicuous characters of this form include the complicated opaque pattern, marginal denticles of right valve, and striate frills of left valve. Its shape and size are very like *P. spongicola*, new species, from which it differs by its smooth exterior, different opaque pattern, and less caudate posterior.

***Paranesidea* species 3**

FIGURE 28 *c–i*; PLATE 1: FIGURES 1, 2

MATERIAL.—One adult male living at Ghardaqua, Egypt, in washings of algae at low tide level (sample HA–33).

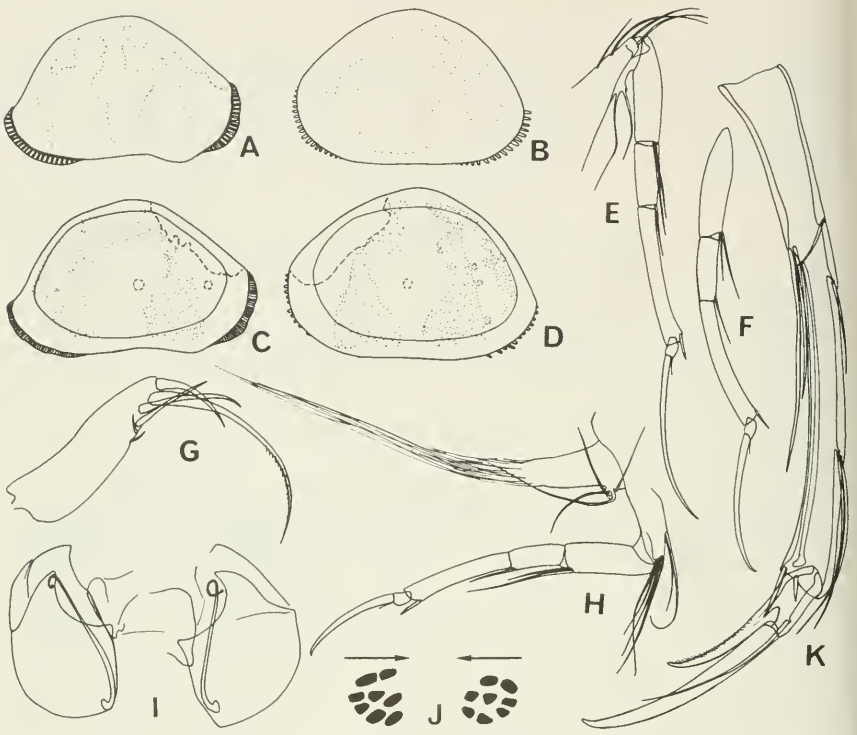


FIGURE 29.—*Paranesidea* sp. 2: A,B,E–H,J,K, Female USNM 121319; C,D, male USNM 121318; I, male USNM 121320.

A–D, Carapace exteriors; E, third thoracic leg; F, second thoracic leg; G, furca; H, first thoracic leg; I, fragmentary copulatory organ; J, muscle-scar pattern; K, antenna. A–D, × 37; E,F,H,I, × 152; G,K, × 301.

DIMENSIONS.—Adult male USNM 121321, left valve, length 0.70 mm, height 0.43 mm; right valve, length 0.69 mm, height 0.39 mm.

AFFINITIES.—Carapace very close in shape, size, and punctate surface to *P. algicola*, new species, but not quite as high, left valve with less steeply arched dorsal margin, lacking sulcate break in slope between marginal and medial surface areas.

Paranesidea species 4

FIGURE 28 *a*, *b*; PLATE 1: FIGURES 3, 4

MATERIAL.—Nosy Bé; 10 subfossil specimens.

DIMENSIONS.—USNM 121322, left valve, length 0.74 mm, height 0.45 mm; USNM 121323, right valve, length 0.75 mm, height 0.45 mm.

DISTRIBUTION.—Nosy Bé; rare in carbonate sands on the back-reef platform.

Affinities.—Carapace very similar to *B.* (*Bairdoppilata*) *craterícola*, new species, but lacking bairdoppilatan hingement and having a more exaggerated caudal process.

Genus Uncertain species 1

Figure 30

Material.—One adult male living at *Anton Bruun* station 373F.

Dimensions.—Adult male specimen USNM 121324, left valve, length 1.10 mm, height 0.72 mm; right valve, length 1.03 mm, height 0.65 mm.

Affinities.—The appendage and genital characters (except for the smoothly pointed antennal claw) are conformable with *Neonesidea*, but the carapace shape and marginal spines are those of

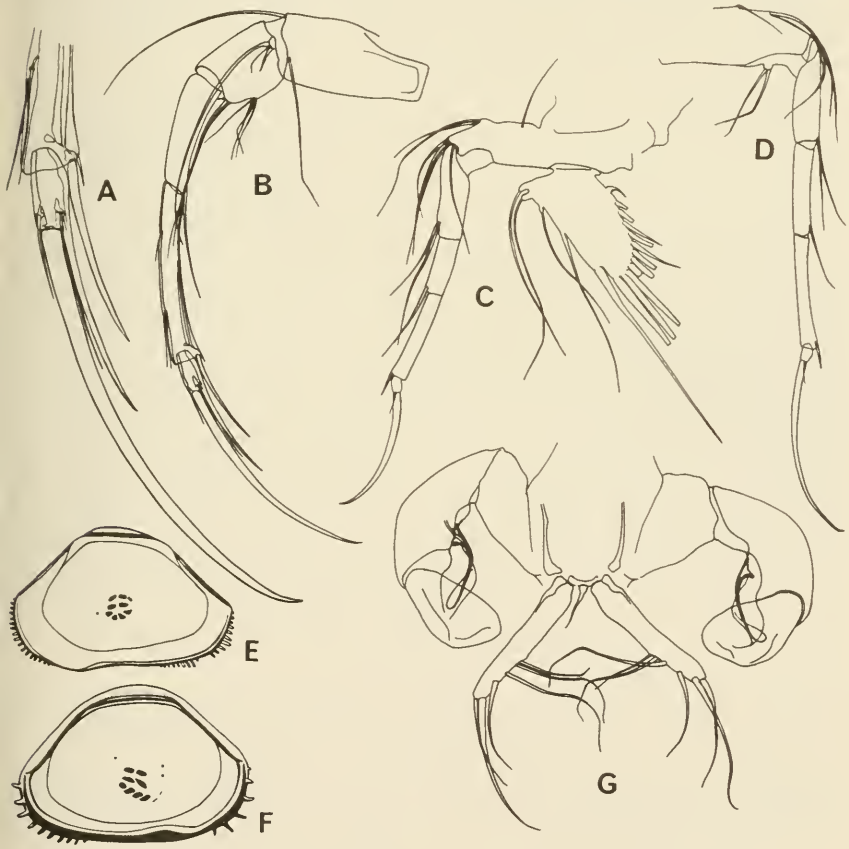


Figure 30.—Genus Uncertain species 1; male USNM 121324.

A,B, Antennae; C, first thoracic leg; D, second thoracic leg; E,F, carapace interiors; G, copulatory organ and furca.

Paranesidea. It is very similar in these respects to *Bairdia serrata* Müller, 1894, and *Bairdia roquebrunensis* Rome, 1942. From these two species it differs by a much more steeply arched dorsum and by the 6 furcal setae, all long (*B. serrata* has 5 long, 2 short; *B. roquebrunensis* has 5 long, 3 short).

Triebelina van den Bold, 1946

Triebelina van den Bold, 1946, pp. 23, 73.—Triebel, 1948, p. 17.—van Morkhoven, 1963, p. 34.

Type-species.—*Triebelina indopacifica* van den Bold, 1946, p. 74 fig. 7.

Diagnosis.—Carapace extremely robust and with exterior ornament of reticulation and usually other ridges and swellings, valves of distinctly different shape and ornament pattern; hinge elements smooth; muscle-scar pattern consists of 8 irregularly elongate scars arranged in 4 parallel diagonal rows.

Female antenna with anterodistal seta about two-thirds the length of distal claw and slightly thickened; 4 featherless setae of branchial plate of first thoracic leg segregated proximally, the first one longest; distal claws of antenna and legs tending to be barbed.

Description.—Carapace more robust for its relatively small size than any other group of Bairdiidae, with left valve very much higher than right valve dorsally, of a more subquadrate shape, and with different lateral pattern of ornamental ridges. Lateral outline of left valve varying from elongate-hexagonal to rhomboidal; right valve with distinctly more produced posterior. Surface deeply pitted in reticulate arrangement, may also have dorsomarginal and ventrolateral thickened crests, nodes, and other swellings. Venter flattened, greatest thickness located near venter. All margins generally edged with abundant thick spines. Hinge simple but deeply incised, all elements smooth. Muscle-scar pattern composed of 8 elongate scars of irregular outline arranged in four evenly spaced parallel rows aligned diagonally at an angle of as much as 45° in right valve, left pattern similar but less steeply tilted and less distorted, showing more visibly its homologies with *Paranesidea*.

Appendage characters generally very similar to *Paranesidea*. Female antenna with distal claw abruptly curved and barbed at its tip, anterodistal seta two-thirds the length of distal claw and equal in thickness to posterodistal seta of podomere 5, fused claw of podomere 6 smooth except for barbed tip. Thoracic legs of female fairly thick and with distally barbed claws; 4 featherless setae of vibratory plate of first leg segregated proximally, the first seta being slightly longer and thicker than the others, which are of equal size. Some setae of maxillar

palp and processes barbed, none pectinate or profusedly feathered. Known furcal types have 5 long and 2 short setae (*T. bradyi*) or 4 long and 3 short setae (*T. sertata*).

Affinities.—The soft-part anatomy is quite similar to that of *Paranesidea*, which also has robust asymmetrical carapace with marginal spines and exterior punctate surface. The antennal characters (smooth fused claw and thickened anterodistal seta) represent an approach toward the characteristic antennal features of *Bairdoppilata*.

Unfortunately, no males are included in the living material available for *T. sertata* and *T. bradyi*, so that, while this is the first description of *Triebelina* anatomy, it must be confined to the female only.

On the basis of carapace exterior, there is a strong case for retaining *Bairdia coronata* Brady within *Triebelina*, but its muscle-scar pattern, hingement, and appendage characters are decidedly bairdoppilatan.

Species included.—Well-established Recent species of *Triebelina* include the following (by original binomen):

Triebelina indopacifica van den Bold, 1946
Triebelina bradyi Triebel, 1948 (=*Bairdia truncata* Brady, 1890)
?*Bairdia raripila* Müller, 1894
Triebelina reticulopuncta Benson, 1959
?*Triebelina schyroconcha*, new species
Triebelina sertata Triebel, 1948
Bairdia tuberculata Brady, 1880 (=*Bairdia rhomboidea* Brady, 1869)

Ecology.—Species of *Triebelina* are restricted to very shallow water and are characteristic of reefs (either coralline or navigational) and high wave-energy level. *T. indopacifica*, *bradyi*, *sertata*, and *tuberculata* are Indo-Pacific—Red Sea in distribution and are typically inhabitants of coral reef masses and talus. Similar unnamed species are reported from comparable environments of Florida (Puri, 1960). The probable habitat of *T. reticulopuncta* is the algal covering of the steep rocky slopes of the coast and islands around Todos Santos Bay, Baja California. If *Bairdia raripila* is in fact a *Triebelina*, then two species are known from temperate latitudes.

Triebelina sertata Triebel, 1948

Figures 31, 32*b–e*; Plate 2: figures 9, 10

Triebelina sertata Triebel, 1948, p. 19, Abb. 1–2.—Key, 1953, p. 158, pl. 1: fig. 5. Species BB, Maddocks, 1966, p. 48, fig. 24.

Material.—Nosy Bé; 4 adult females and several juveniles, 8 subfossil specimens.

Tulear, one adult female living.

Dimensions.—Adult female USNM 121325, right valve, length 0.59 mm, height 0.31 mm; left valve, length 0.60 mm, height 0.34 mm.

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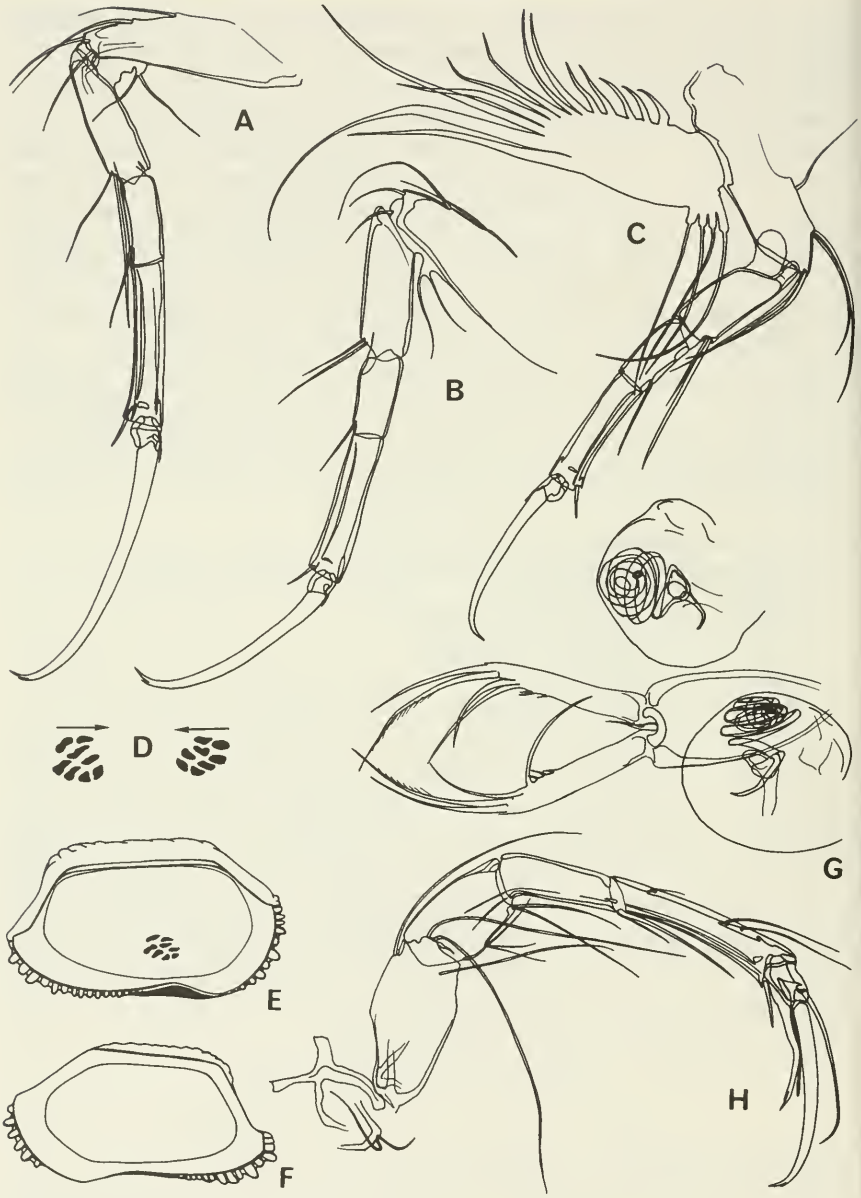

FIGURE 31.—*Triebelina sertata* Triebel: A–C, Female USNM 121326; D–F, female USNM 121328; G,H, female USNM 121327.

A, Third thoracic leg; B, second thoracic leg; C, first thoracic leg; D, muscle-scar pattern; E,F, carapace interiors; G, genital lobe and furca; H, antenna. A–C,G,H, × 301; D, × 86; E,F, × 61.

HABITAT.—On living corals, *Tridacna*, dead coral fragments, and calcareous algae in the coral reef zone, Nosy Bé and Tulear, Madagascar.

SUBFOSSIL DISTRIBUTION.—Nosy Bé; in carbonate sands from the reef and lower beach zones.

Described by Triebel from the Red Sea; possibly reported from Indonesia (as *T. indopacifica* or *T. cubensis*) by Key (1953), van den Bold (1946), and Kingma (1948).

AFFINITIES.—Appendages similar to those of *T. bradyi*, but readily distinguished by the furca with 7 setae, setae 5, 6, and 7 being extremely short.

***Triebelina bradyi* Triebel, 1948**

FIGURES 32*a*; 33*a-d*; PLATE 2: FIGURE 3

Bairdia truncata Brady (not Kirkby) 1890, p. 494, pl. 2: figs. 1, 2.
Triebelina bradyi Triebel, 1948, p. 18.—?van den Bold, 1950, p. 901.—?Key, 1953, p. 158, pl. 1: fig. 4.—not Puri, 1960, p. 132, pl. 6: figs. 7, 8.

MATERIAL.—Nosy Bé; one adult female and several juveniles living; 21 subfossil specimens.

DIMENSIONS.—Adult female USNM 121325, right valve, length 0.55 mm, height 0.30 mm.

HABITAT.—Nosy Bé; collected in washings of dead coral fragments at Ambatoloaka.

SUBFOSSIL DISTRIBUTION.—Sparsely distributed in carbonate reef and intertidal sands at Nosy Bé, Madagascar.

Originally described from Samoa and New Caledonia by Brady (1890), reported from Recent and Pleistocene of Indonesia by Key (1953).

AFFINITIES.—Appendages similar to those of *T. sertata*, but readily distinguished by the furca with 7 setae, setae 6 and 7 very much shorter than others. Carapace distinguished from that of *T. reticulopuncta* by its more subquadrate outline, lack of defined ventrolateral ridge, having instead two vaguely defined ventrolateral swellings, and larger marginal spines.

***Triebelina reticulopuncta* Benson, 1959**

FIGURE 33*e*, *f*; PLATE 2: FIGURES 5, 6

Triebelina reticulopuncta Benson, 1959, p. 44, pl. 2: fig. 1; pl. 8: fig. 4.

MATERIAL.—Holotype specimen USNM 113123.

DIMENSIONS.—Left valve, length 0.58 mm, height 0.31 mm; right valve, length 0.58 mm, height 0.30 mm.

DISTRIBUTION.—Bahia de Todos Santos, Baja California, Mexico.

AFFINITIES.—Most similar to *T. bradyi* of species described, but not as high, dorsal margin of right valve sloping more steeply posteriorly, ventrolateral ridge more defined, smaller marginal spines.

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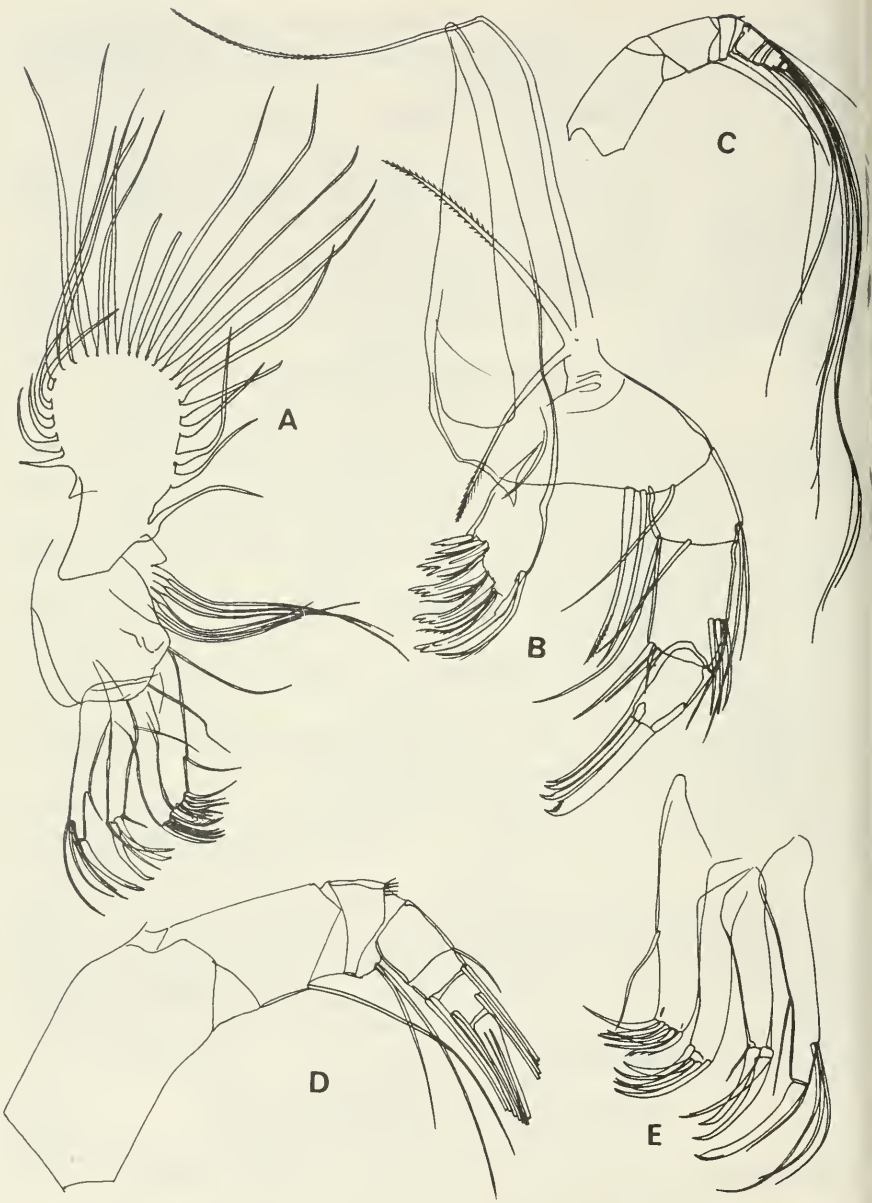

FIGURE 32.—*Triebelina bradyi* Triebel: A, Female USNM 121325. *T. sertata* Triebel; B,D E, female USNM 121327; C, female USNM 121328.
A,E, Maxilla; B, mandible; C,D, antennule. A,B,D,E, × 472; C, × 201.

***Triebelina schyroconcha*, new species**

FIGURE 33*g*, *h*; PLATE 2: FIGURES 7, 8

? *Bairdia tuberculata* Brady of Brady, 1880, p. 60, pl. 10: fig. 3a–d.—Brady, 1890, p. 495.

Not *Bairdia tuberculata* Brady, 1880 [=*Bairdia rhomboidea* Brady (not Kirkby), 1867, p. 162, pl. 19. figs. 14, 15].—Van den Bold, 1966, pl. 2: fig. 3.

ETYMOLOGY.—Greek *schyr*, hedgehog + *konche*, shell.

TYPE SPECIMENS.—Holotype USNM 121331; paratypes USNM 121332–121333.

TYPE LOCALITY.—Nosy Bé, Madagascar, sample 504 (carbonate sand among patch reefs at Ambariobe).

MATERIAL.—Three subfossil specimens from Nosy Bé.

DIAGNOSIS.—Carapace small but very robust, extremely broad, ventrally flattened, lateral outline almost perfectly rhomboidal. Exterior covered with extremely numerous very tiny spines. No pits or

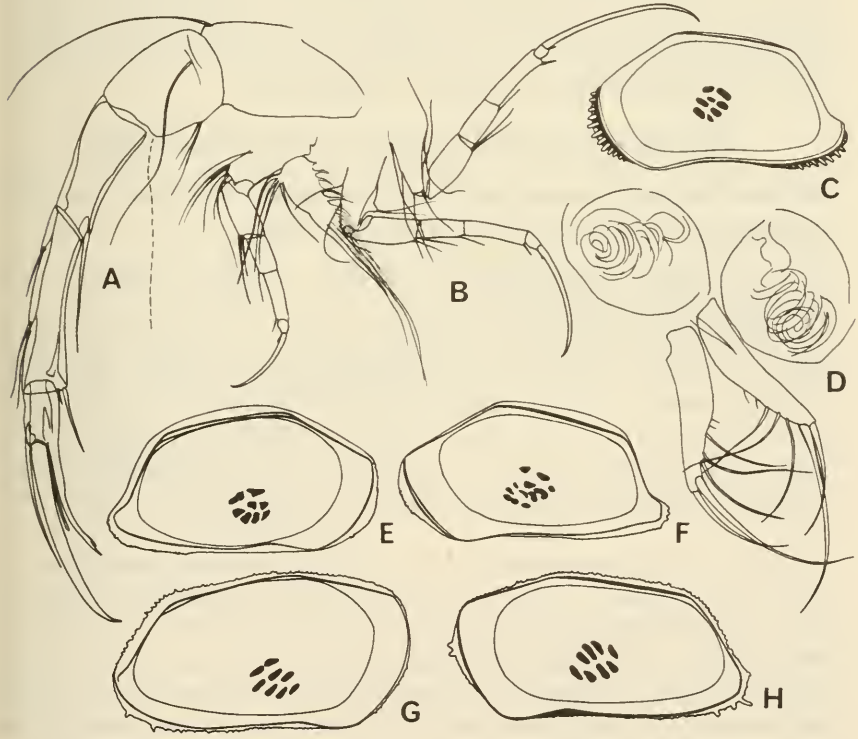

FIGURE 33.—*Triebelina bradyi* Treibel: A–D, Female USNM 121325. *T. reticulopuncta* Benson: E,F, Holotype USNM 113123. *T. schyroconcha*, n. sp.: G, USNM 121331; H, USNM 121332.

A, Antenna; B, thoracic legs; C,E–H, carapace interiors; D, furca and genital lobe. A,D, × 301; B, × 152; C,E–H, × 61.

other surface ornament present. Two or three posteroventral marginal spines are somewhat larger than others, marginal denticulation absent. Hinge narrow but deeply incised, all parts smooth. Muscle-scar pattern conspicuous as glassy irregular scars in otherwise translucent yellow-white carapace, arranged in four diagonally offset rows.

Dimensions.—USNM 121331, left valve, length 0.46 mm, height 0.24 mm.

USNM 121332, right valve, length 0.46 mm, height 0.22 mm.

Distribution.—In sand among coral patch reefs at Ambariobe, Nosy Bé, Madagascar. Possibly misidentified as *B. tuberculata* by Brady (1880) from the Admiralty Islands and (1890) from Noumea, New Caledonia.

Affinities.—*Bairdia tuberculata* Brady, 1880 [=*Bairdia rhomboidea* Brady, 1867 (not Kirkby)] is of similar rhomboidal shape, but its exterior is entirely reticulate, without lateral spines; the species was first reported from Mauritius and has since been reported from Colon-Aspinwall, Panama. Specimens assigned to *B. tuberculata* from the Admiralty Islands and New Caledonia were described as having tiny tubercles and probably belong to *T. schyroconcha*.

Bairdoppilata Coryell, Sample, and Jennings, 1935

Bairdoppilata (*Bairdoppilata*) Coryell, Sample, and Jennings, 1935

Bairdoppilata Coryell, Sample, and Jennings, 1935, p. 3.

Type-species.—*Bairdoppilata martyni* Coryell, Sample, and Jennings, 1935, p. 3, figs. 1, 2.

Diagnosis.—Carapace with rounded contours, lateral outline with slightly concave anterodorsal and posterodorsal margins; somewhat produced posterior. Hinge with auxiliary dentition at the anterior and posterior ends, 4–6 tiny denticles on ends of right valve ridge articulating with sockets beneath left valve overlap. Muscle-scar pattern consists of 8–10 scars in three widely spaced horizontal or arcuate rows.

Antenna with anterodistal seta enlarged to equal distal claw in size and appearance; fused claw smooth. Four unfeathered setae of vibratory plate of first thoracic leg segregated proximally, all of equal length. Furca with 7 setae, all long.

Description.—Carapace moderately thin, translucent; opaque spots characteristically arranged in a distinctive pattern, consisting of small central suboval spot, anterior and posterior spots, possibly also a posterodorsal spot and one or more other dorsal spots. Surface smooth with abundant very tiny pits. Lateral outline of left valve with broadly arched dorsal margin, broadly and obliquely rounded anterior margin, produced caudate posterior termination, straight

anterodorsal segment and concave posterodorsal segment; right valve with obscurely angulate tripartite dorsal margin, anterodorsal and posterodorsal segments straight or slightly concave, posterior distinctly caudate, ventral margin slightly indented. Curvature of lateral surface very gentle, without any abrupt changes in slope, moderately expanded medially, more compressed marginally and ventrally. Hinge-proper simple and usually quite thin, median bar of right valve of equal thickness throughout; auxiliary dentition present at anterodorsal and posterodorsal angles at location of greatest marginal concavity, consisting in right valve of 4–6 tiny denticles surmounting anterodorsal or posterodorsal marginal ridge, in left valve of visibly locellate or crenulate arcuate grooves with ventral confining rise, located directly underneath overhang of dorsal surface. Muscle-scar pattern consists of 8 subcircular to subquadrate scars arranged in three horizontal to arcuate well separated rows, scars of dorsal or ventral rows tending to be divided for a total of 10 scars.

Antenna of both sexes with near-duplicate, pincer-form, immovable terminal claws, caused by the enlargement of the anterodistal seta of the sixth podomere to equal or nearly equal the distal claw in size and shape; all claws smooth and simply tapering, slightly curved, none barbed or serrate. Vibratory plate of first thoracic leg with 4 unfeathered setae of equal length segregated proximally. Furca with 7 setae, of varying lengths but all fairly long, none vestigial. Copulatory organ with massive hemicircular median lobe, bulbous distal lobe, long spirally coiled copulatory tube without conspicuous lamellar supporting structure, may have additional projecting structures.

Species included.—Recent species for which soft parts have been described, listed by original binomen:

Bairdoppilata alcyonicola, new species
Bairdoppilata cratericola, new species
Nesidea cushmani Tressler, 1949 [=*Bairdoppilata carinata* Kornicker, 1961; =*Bairdoppilata triangulata* Edwards of Benson and Coleman, 1964]
Bairdia hirsuta Brady, 1880
Bairdia simplex Brady, 1880
Bairdia villosa Brady, 1880

Ecology.—Recent species of *Bairdoppilata* (*Bairdoppilata*) are abundant in tropical and subtropical regions in very shallow-water niches as epifauna on coralline and rocky reefs, algae, sea grasses, corals, sponges, other attached invertebrates, and associated skeletal debris. The three *Challenger* species assigned below to this group from abyssal depths and/or much colder water also share several discordant features of carapace and genital anatomy; they should certainly be allocated a new subgenus within *Bairdoppilata* when more plentiful living material becomes available.

Affinities.—Reported species of *Bairdoppilata* range from Lower Cretaceous through Recent; the type species is Miocene. While no effort was made to study fossil materials for this report, such illustrations and specimens as have come to my casual attention (chiefly Eocene-Miocene) appear to be compatible in carapace morphology with the Recent species described below.

The bairdoppilatan nature of the soft parts of *Bairda coronata* Brady is unmistakable, in spite of its superficial resemblance to *Triebelina*. Hence *Glyptobairdia* must be revived for a subgenus of *Bairdoppilata*.

Yet another subgenus of *Bairdoppilata* is indicated by the three abyssal and/or cold-water species of Brady (1880) reidentified in these collections, but naming of this category must be postponed until better preserved material is available for description. And for any more detailed subgeneric classification, the great variety of Cretaceous and Cenozoic species should also be taken into consideration.

Remarks.—E. and R. Reyment (1959) suggested that *Bairdoppilata* should be considered a synonym of "*Bairdia*," because they observed the hinge denticles to vary in visibility within one species, and because similar denticles are also present in *Bairdia coronata* Brady, assigned at that time to *Triebelina*. This opinion has been sustained independently by some other taxonomists, including van Morkhoven (1958, 1963). However, the Recent species studied here show significant and consistent differences in soft-part anatomy, shape, and opaque pattern that are congruent with and perhaps even more consistently expressed than the hinge dentition.

***Bairdoppilata* (*Bairdoppilata*) *cushmani* (Tressler), 1949**

Figures 34; 35*h-m*

Nesidea cushmani Tressler, 1949, p. 342 figs. 4–8.
Bairdoppilata carinata Kornicker, 1961, p. 66, pl. 1: fig. 5a-e; figs. 9A-J, 10B-C, E.
Bairdoppilata triangulata Edwards of Benson and Coleman, 1963, p. 20, pl. 3: figs. 1–3; fig. 9.

Material.—Holotype female specimen USNM 88843. The decalcified valves and fragmentary appendages are mounted together on a single glass slide beneath a cover slip.

Paratype specimen 122B of *Bairdoppilata carinata* Kornicker (1961, fig. 10C). Subfossil specimens from the Bimini collections of Kornicker (1961), including a male and a female containing dried appendages.

Subfossil specimens from the west coast of Florida collections of Benson and Coleman, including specimen USNM 113187, labeled *Bairdoppilata triangulata* Edwards, 1944. Subfossil specimens in an associated collection from Florida Bay, including an adult male with dry appendages.

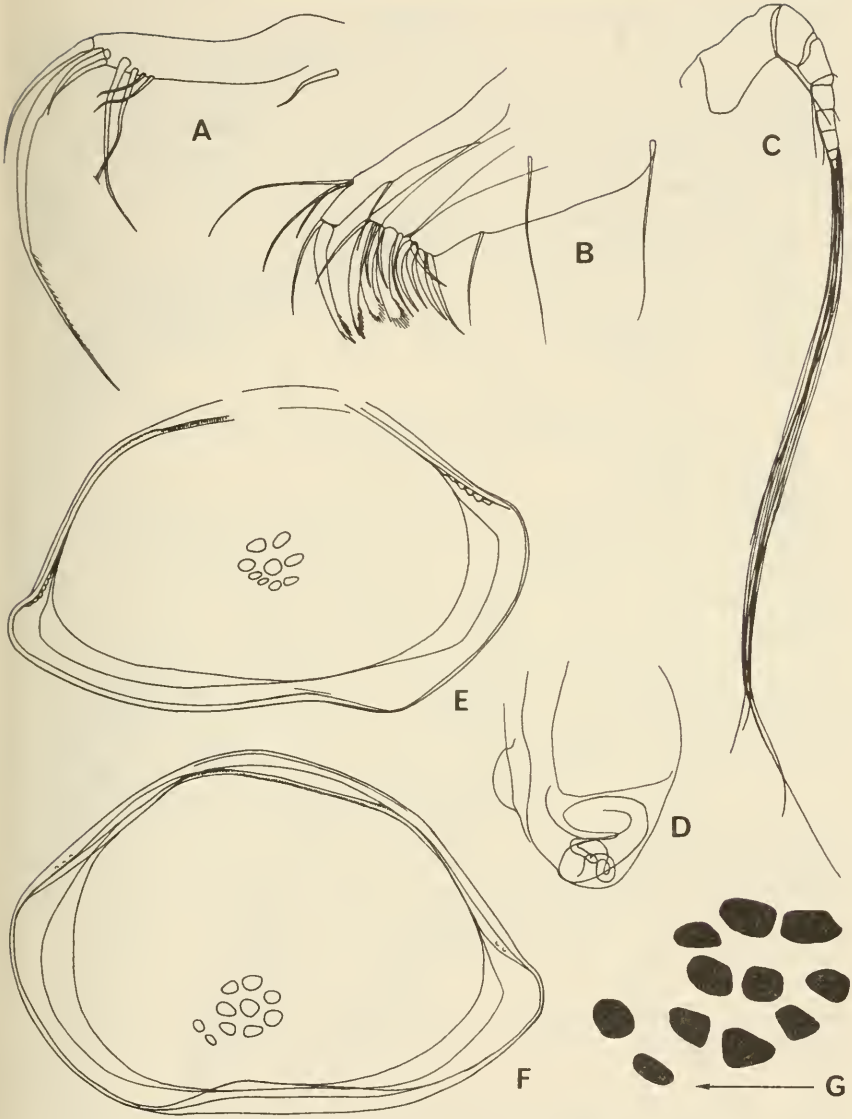

FIGURE 34.—*B.* (*Bairdoppilata*) *cushmani* (Tressler): Holotype USNM 88843.
A, Furca; B, maxilla; C, antennule; D, genital lobe; E,F, carapace exteriors; G, muscle-scar pattern. A–D, × 301; E,F, × 72; G, × 201.

DIMENSIONS.—Holotype of *Nesidea cushmani* Tressler, USNM 88843, female, measured as mounted; left valve, length 0.99 mm, height 0.67 mm; right valve, length 0.96 mm, height 0.60 mm.

Paratype male USNM 121334 of *Bairdoppilata carinata* Kornicker; left valve, length 1.06 mm, height 0.68 mm; right valve, length 1.05 mm, height 0.62 mm.

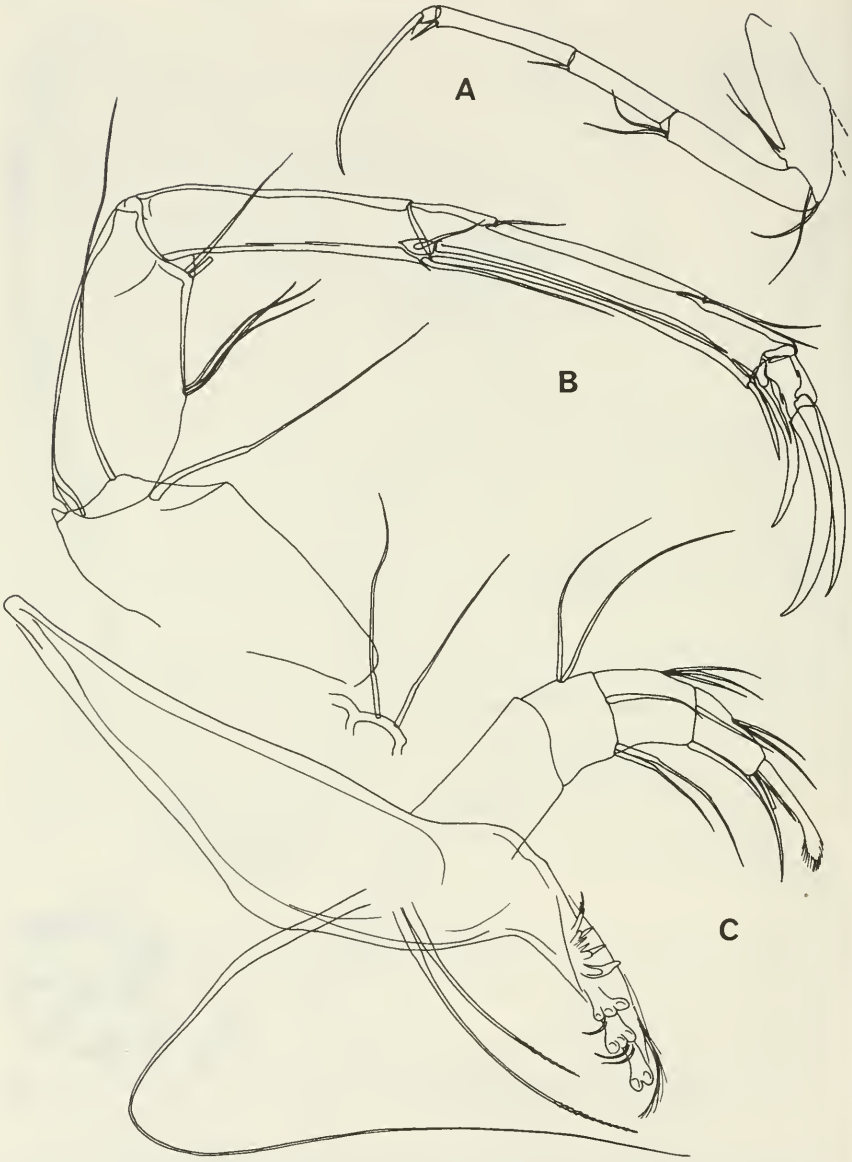

FIGURE 35.—*B.* (*Bairdoppilata*) *cushmani* (Tressler): Holotype USNM 88843. A, Thoracic leg, × 152; B, antenna, × 301; C, mandible, × 301.

DISTRIBUTION.—Loggerhead Key, Tortugas, Florida; Florida Bay and west coast of Florida; Bimini Island, Great Bahama Bank.

REMARKS.—Of the Loggerhead Key collections listed by Tressler (1949), only the holotype specimen belongs to *Nesidea cushmani* Tressler. The other specimens (undissected), which he considered

to be paratypes, belong to another species, described above as *Neonesidea gerda* (Benson and Coleman).

Affinities.—Comparison and identification of other specimens with the holotype are rendered difficult by the present condition of the valves. However, specimens identified as *B. triangulata* Edwards by Benson and Coleman from nearby stations in Florida Bay and the west coast of Florida are very similar in shape and size. *B. carinata* Kornicker is larger and has more widely spaced punctae, but the carapace shape, opaque pattern, and copulatory organ are identical to those of the Florida Bay specimens. The antennal claws of the *N. cushmani* holotype and *B. carinata* allotype female specimens are identical.

***Bairdoppilata* (*Bairdoppilata*) *alcyonicola*, new species**

Figures 36–38

Etymology.—Latin *alcyonium*, polyp + *-cola*, dweller; from its occurrence on such usually inimical hosts as alcyonarians and *Millepora*.

Type specimens.—Adult male holotype specimen USNM 121337; allotype female USNM 121338; paratypes USNM 121339–121341.

Type locality.—Nosy Bé, Madagascar, sample 446 (washings of dark green alga at low tide level of beach at Antsakoabe).

Diagnosis.—Carapace with moderately produced posterior end and slightly concave posterodorsal margin, straight anterodorsal margin in lateral view; exterior smooth with very tiny normal pore canal pits, terminal dentition of hinge conspicuous.

Antenna with distal claws short and thick and of equal size; copulatory organ with hemispherical median lobe and roughly quadrangular distal lobe, long spiral copulatory tube, moderately long seta arising at junction of lobes.

Material.—Specimens, 122 living and 76 subfossil from Nosy Bé. One male living at Anse Royale.

Dimensions.—Adult male holotype USNM 121337, left valve, length 0.86 mm, height 0.53 mm; right valve, length 0.88 mm, height 0.48 mm.

Adult female USNM 121338, left valve, length 0.87 mm, height 0.55 mm; right valve, length 0.86 mm, height 0.49 mm.

Habitat.—Abundant in almost all epifaunal reef niches, notably on living corals, sponges, alcyonarians, and *Millepora*, also on algae and dead coral fragments. This is the only podocopid species found on living specimens of *Millepora* and, with *Neonesidea schulzi schulzi*, the bairdian species typically collected from living sponges, alcyonarians, and reef corals.

Subfossil distribution.—Present but never abundant in most carbonate sediments, especially beach, reef and platform sands.

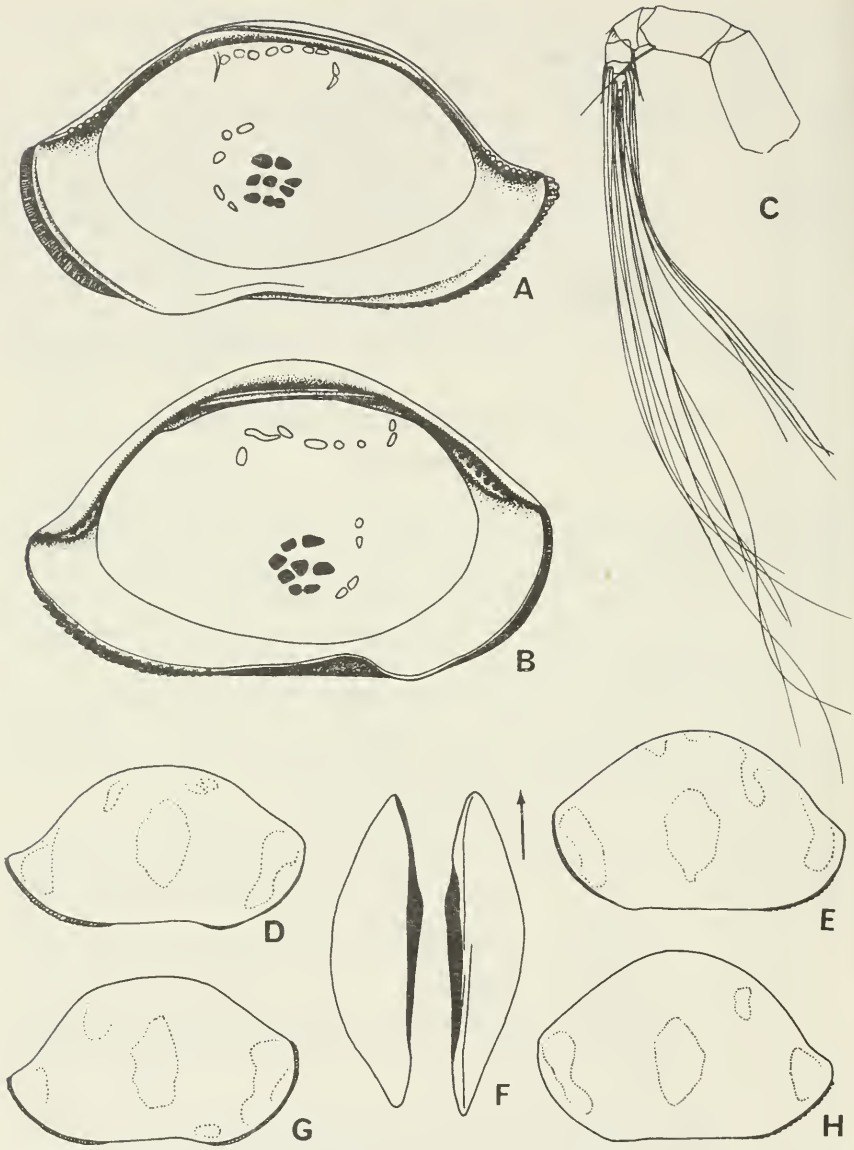

FIGURE 36.—*B.* (*Bairdoppilata*) *alcyonicola*, n. sp.: A–F, Male USNM 121337; G,H, female USNM 121338.

A,B, Carapace interiors, × 75; C, antennule, × 152; D,E,G,H, carapace exteriors, × 43; F, dorsal view, × 43.

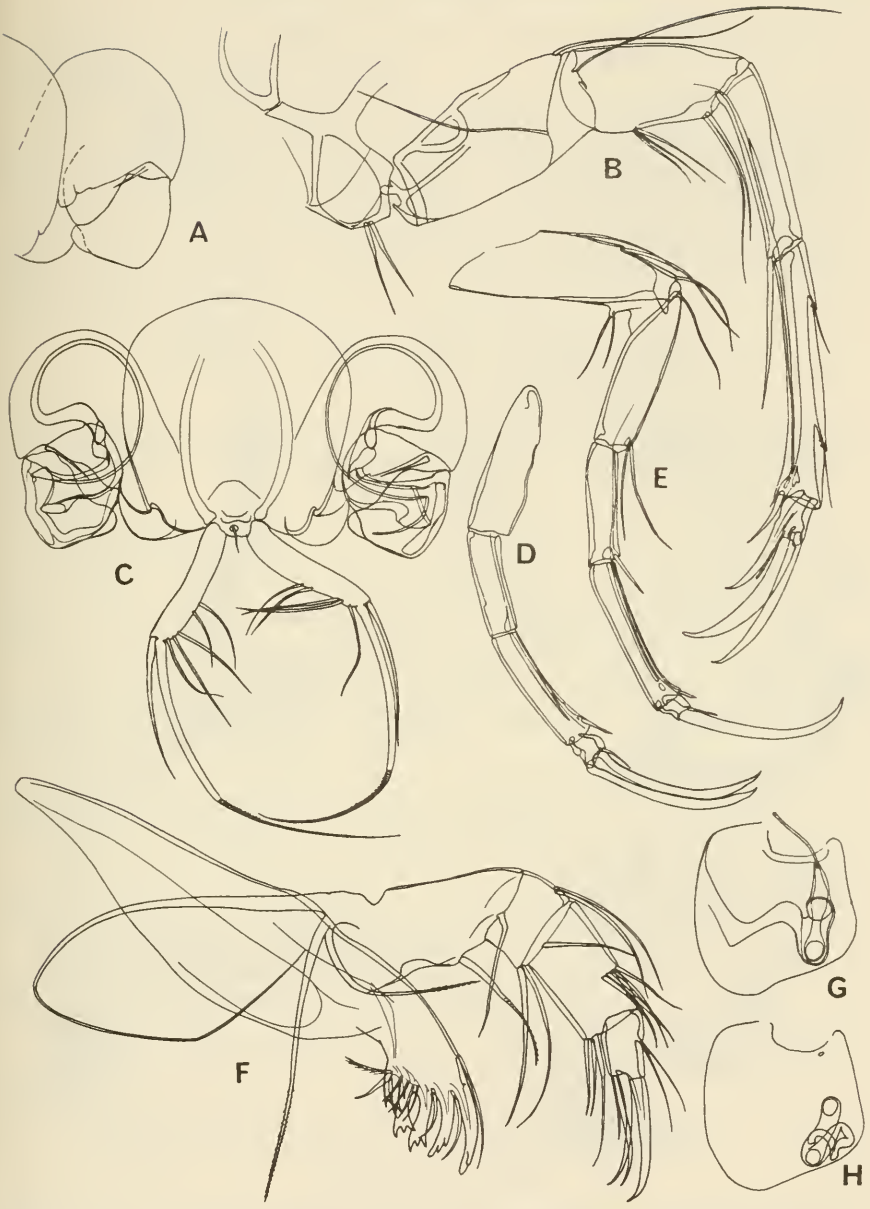

FIGURE 37.—*B.* (*Bairdoppilata*) *alcyonicola*, n. sp.: A–C,E,F, Male USNM 121337; D pathological male USNM 121339; G,H, female USNM 121338.

A, Copulatory organ; B, antenna; C, copulatory organ and furca; D, pathological second thoracic leg; E, normal second thoracic leg; F, mandible; G,H, genital lobes. A–C,G,H, × 236; D,E, × 201; F, × 301.

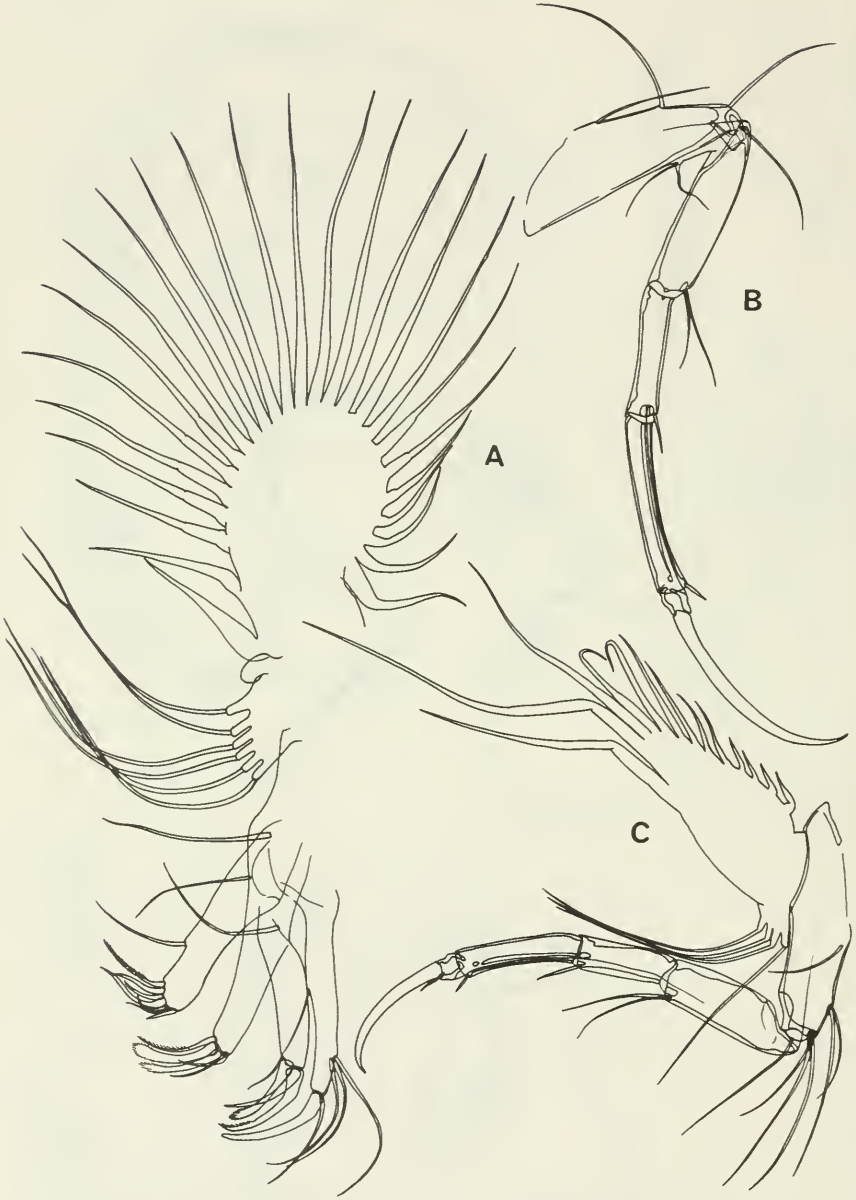

FIGURE 38.—*B.* (*Bairdoppilata*) *alcyonicola*, n. sp.: Male USNM 121337.
A, Maxilla, × 301; B, third thoracic leg, × 201; C, first thoracic leg, × 201.

Affinities.—Very similar to the more caudate and punctate *B.* (*B.*) *cratericola* also living at Nosy Bé.

Remarks.—One pathological specimen USNM 121339 has the distal claw of the second thoracic leg duplicated in a fashion identical with the antennal claws (Figure 37*d*). Presumably this is the result of an injury; yet it confirms the close homologic relationship between the antennae and thoracic legs suggested by the often identical configuration of barbs or other details of distal termination and consistent relative proportions of podomere dimensions.

***Bairdoppilata* (*Bairdoppilata*) *cratericola*, new species**

Figure 39

Etymology.—Latin *crater*, basin+*-cola*, dweller; for the Lac du Cratère, Nosy Bé, Madagascar; a picturesque wave-breached volcanic crater.

Type specimens.—Adult male holotype USNM 121342; paratypes USNM 121323.

Type locality.—Nosy Bé, Madagascar, sample 359 (washings of dead coral fragments encrusted with living algae, sponges, corals, and tunicates, from just below low tide level in the Lac du Cratère).

Diagnosis.—Carapace fairly compressed, anterior and especially posterior end produced in caudate fashion, exterior distinctly punctate.

Copulatory organ with distal lobe approximately triangular in outline, bearing no setae or other projections.

Material.—Nosy Bé; 7 living specimens, 203 subfossil specimens.

Dimensions.—Adult male USNM 121342, left valve, length 0.88 mm, height 0.56 mm; right valve, length 0.89 mm, height 0.50 mm.

Habitat.—Collected living only at the type locality.

Subfossil distribution.—Abundantly distributed in carbonate sands and sandy muds, especially near coral reefs.

Affinities.—Very similar in carapace and appendage morphology to *B.* (*B.*) *alcyonicola*, new species, another common species at Nosy Bé.

***Bairdoppilata* (*Bairdoppilata*?) *villosa* (Brady), 1880**

Figures 40, 41*a-c*

Bairdia villosa Brady, 1880, p. 50, pl. 3: fig. 3a-b; pl. 5: fig. 2a-f; pl. 8: 4a-f.

Material.—Three valves and one whole carapace, all mature, in *Challenger* slide 140, British Museum (Natural History) cat. no. 80.38, labeled as station 149, Balfour Bay, Kerguelen Island. The whole carapace has been designated lectotype by H. S. Puri, Neil C. Hulings, and Richard H. Benson (MS.).

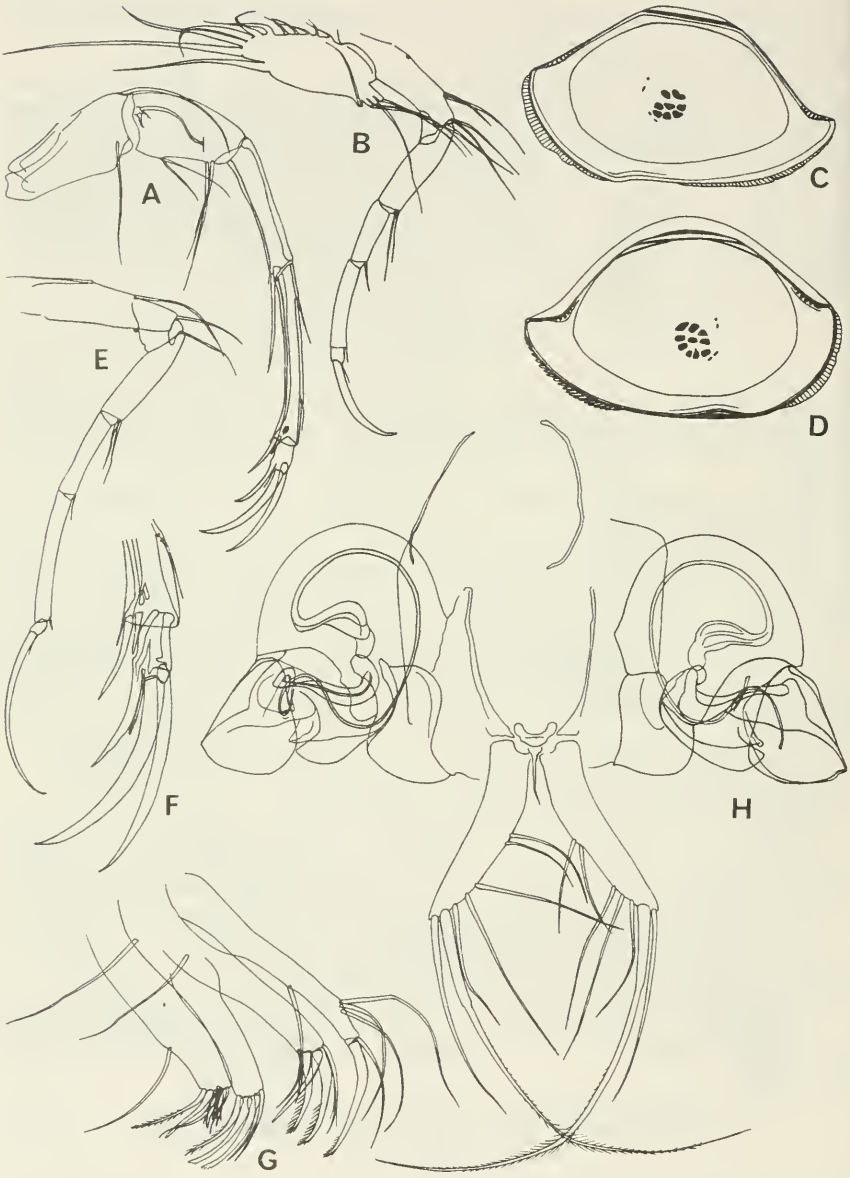

FIGURE 39.—*B.* (*Bairdoppilata*) *cratericola*, n. sp.: Male USNM 121342.
A,F, Antenna; B, first thoracic leg; C,D, carapace interiors; E, third thoracic leg; G, maxilla; H, copulatory organ and furca. A, × 152; B,E, × 127; C,D, × 50; F–H, × 301.

Two adult males living at *Eltanin* station 1418.

One immature female tentatively identified as this species, living in an intertidal collection from Prince Edward Island.

Dimensions.—Adult male USNM 121344, left valve, length 1.28 mm, height 0.81 mm; right valve, length 1.24 mm, height 0.77 mm.

Affinities.—The terminal hinge dentition is less marked in this form than in the more typical shallow-water species of *Bairdoppilata;* however, it is clearly visible on the *Challenger* paratype specimens. The lectotype specimen is more highly and angularly arched dorsally than the paratypes, and its hinge has not been seen. The *Eltanin* specimens are very slightly smaller and more elongate than the paratypes.

The less conspicuous hinge dentition, more convex lateral outline, and short, nearly straight copulatory tube are characters shared by *B.* (*B.*?) *simplex* (Brady) and in part by *B.* (*B.*?) *hirsuta.* For these species another subgeneric category probably should be established.

Distribution.—Kerguelen I., Macquarie I., Prince Edward I.; reported by Brady (1880) from Tristan d'Acunha and Bass Strait. Subsequent reports of this species are numerous but mostly unconvincing.

***Bairdoppilata* (*Bairdoppilata*?) *simplex* (Brady), 1880**

(Figure 42)

Bairdia simplex Brady, 1880, p. 51, pl. 7: fig. 1a–d.
Nesidea labiata Müller, 1908, p. 99, pl. 14: figs. 1–6.

Material.—A left and a right valve, of the same specimen, in *Challenger* slide no. 142, British Museum (Nat. Hist.) cat. no. 81.5, labeled station no. 151, off Heard I., depth 75 (fms); designated lectotype by Puri, Hulings, and Benson (MS.).

One male living at *Eltanin* station 1345; one male and one female living and one empty carapace at *Eltanin* 418; 25 subfossil specimens at *Eltanin* stations 1345, 1346; 4 subfossil specimens from GIL 615, South Africa.

Dimensions.—Adult female USNM 121347, right valve, length 1.97 mm, height 0.97 mm.

Adult male specimen USNM 121348, left valve, length 1.62 mm, height 0.96 mm; right valve, length 1.64 mm, height 0.92 mm.

Distribution.—Off Heard I.; Palmer Peninsula, Gauss Station, Antarctica; South Indian-Antarctic Basin; ? False Bay, South Africa.

Affinities.—The *Eltanin* specimens are slightly larger, more angulate in outline and more inflated than the *Challenger* valves; their terminal hinge dentition is much weaker than that of the lectotype, with no visible teeth in the right valve and only obscurely serrate grooves in the left.

The anterodistal antennal claw is not as long or thick as the distal claw, although sufficiently developed to be considered bairdoppilatan.

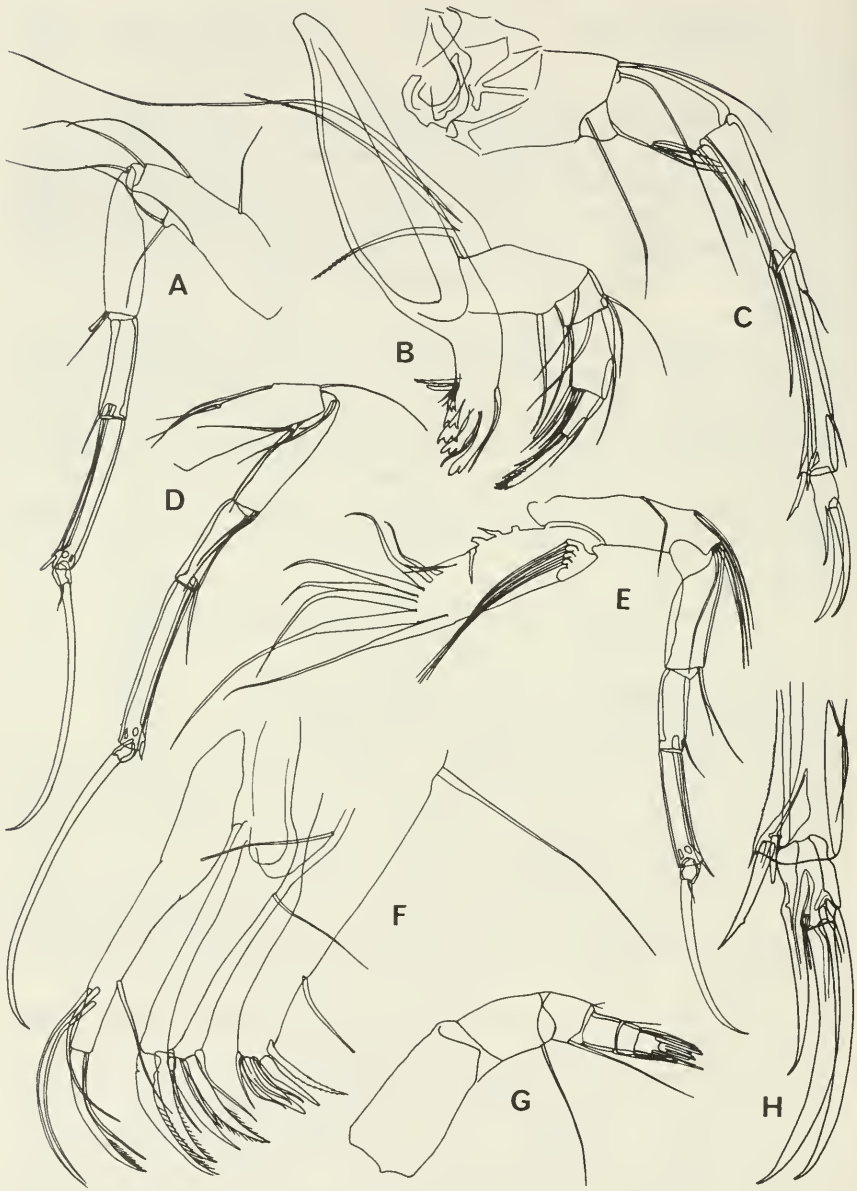

FIGURE 40.—*B.* (*Bairdoppilata?*) *villosa* (Brady): Male USNM 121344.
A, Second thoracic leg; B, mandible; C,H, antenna; D, third thoracic leg; E, first thoracic leg; F, maxilla; G, antennule. A,C,D,E,G, × 127; B, ×152; F,H, × 301.

The False Bay specimens are considerably smaller but otherwise very similar.

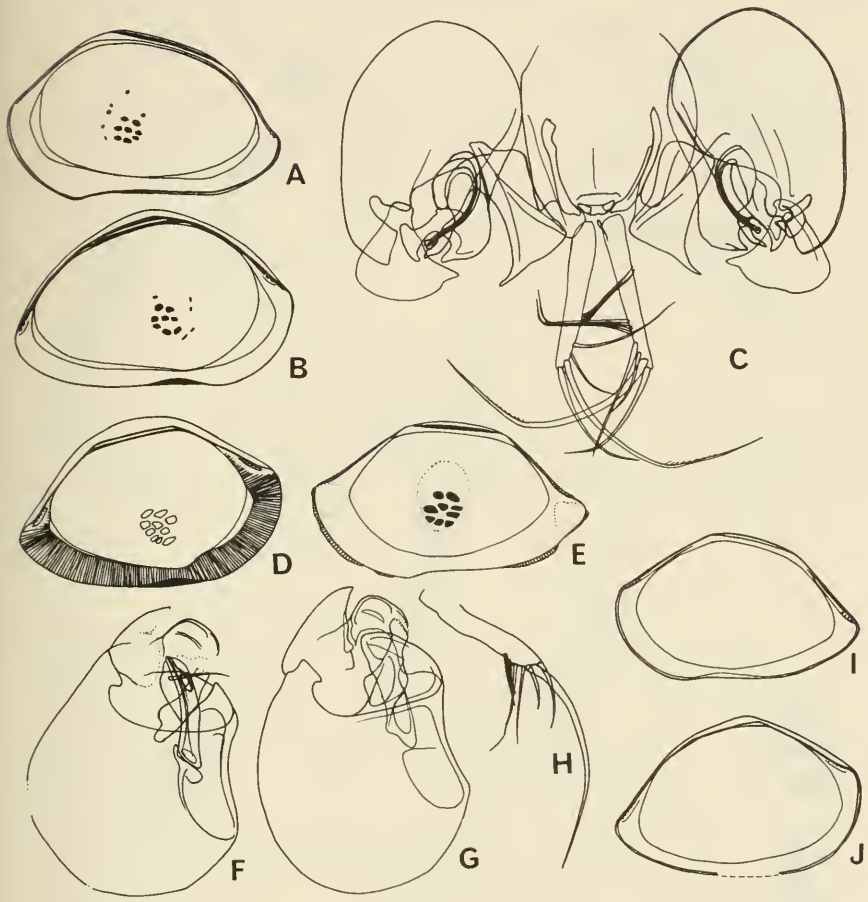

FIGURE 41.—*B.* (*Bairdoppilata*?) *villosa* (Brady): A–C, Male USNM 121344. *B.* (*Bairdoppilata*) sp. 2: D–H, Male USNM 121358. *B.* (*Bairdoppilata*) sp. 1; I, USNM 121356; J, USNM 121357.

A,B,D,E,I,J Carapace interiors, × 29; C, copulatory organ and furca, × 127; F,G, copulatory organ, × 152; H, furca, × 152.

Bairdoppilata (*Bairdoppilata*?) *hirsuta* (Brady), 1880

FIGURE 43; PLATE 2: FIGURES 1, 2

Bairdia hirsuta Brady, 1880, p. 51, pl. 8: fig. 3a–d.

?*Bairdia victrix* Brady of Brady, 1880, p. 56, pl. 10, fig. 5a–d.—Tressler, 1954, p. 433.

MATERIAL.—A single right valve in slide no. 138 of the *Challenger* collection of Brady (1880), labeled from station 300, D(epth) 1375 (fms); designated lectotype by Puri, Hulings, and Benson (MS.).

Two adult females living and 5 subfossil valves from sample USNM Acc. No. 271766 in the Gulf of Mexico.

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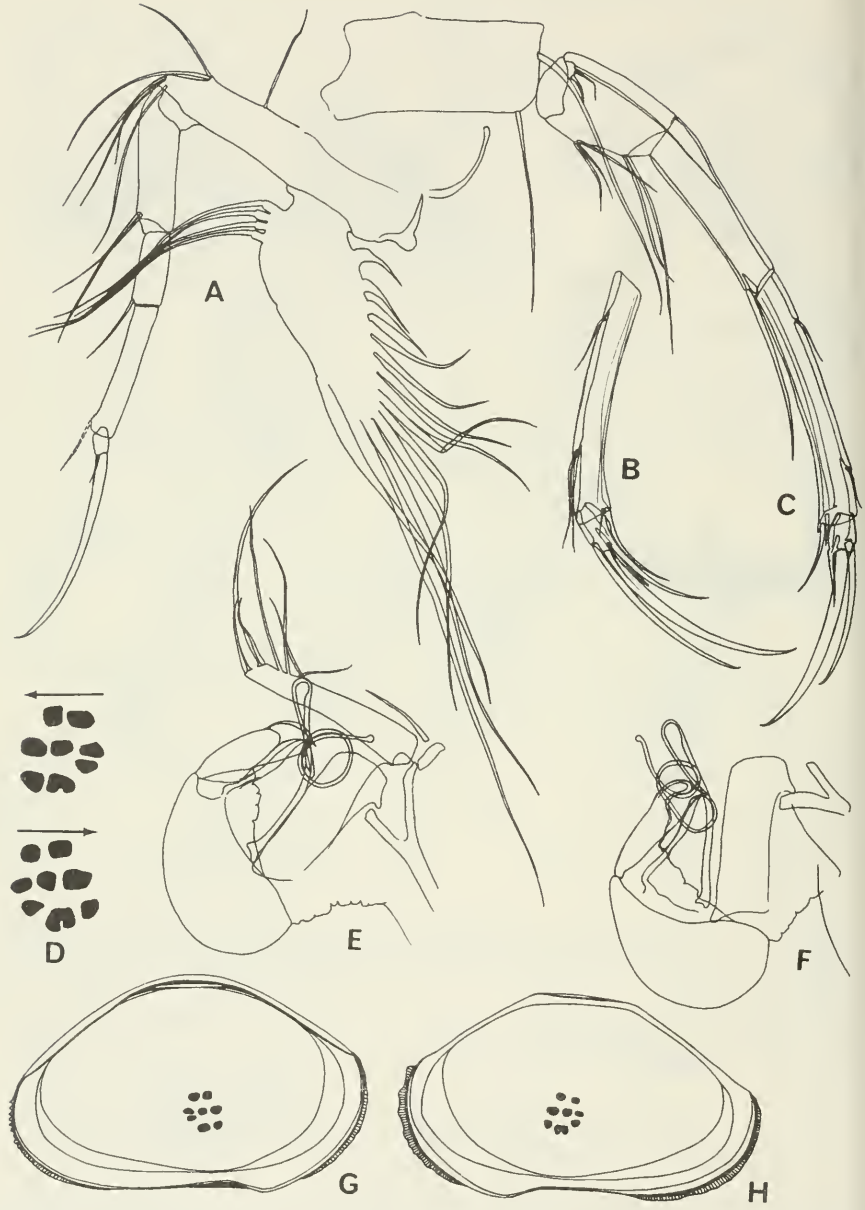

FIGURE 42.—*B.* (*Bairdoppilata?*) *simplex* (Brady): A,C–H, Male USNM 121348; B, female USNM 121347.

A, First thoracic leg; B,C, antenna; D, muscle-scar pattern; E,F, copulatory organ and furca; G,H, carapace interiors, A,C,E,F, × 127; B, × 152; D, × 61; G,H, × 29.

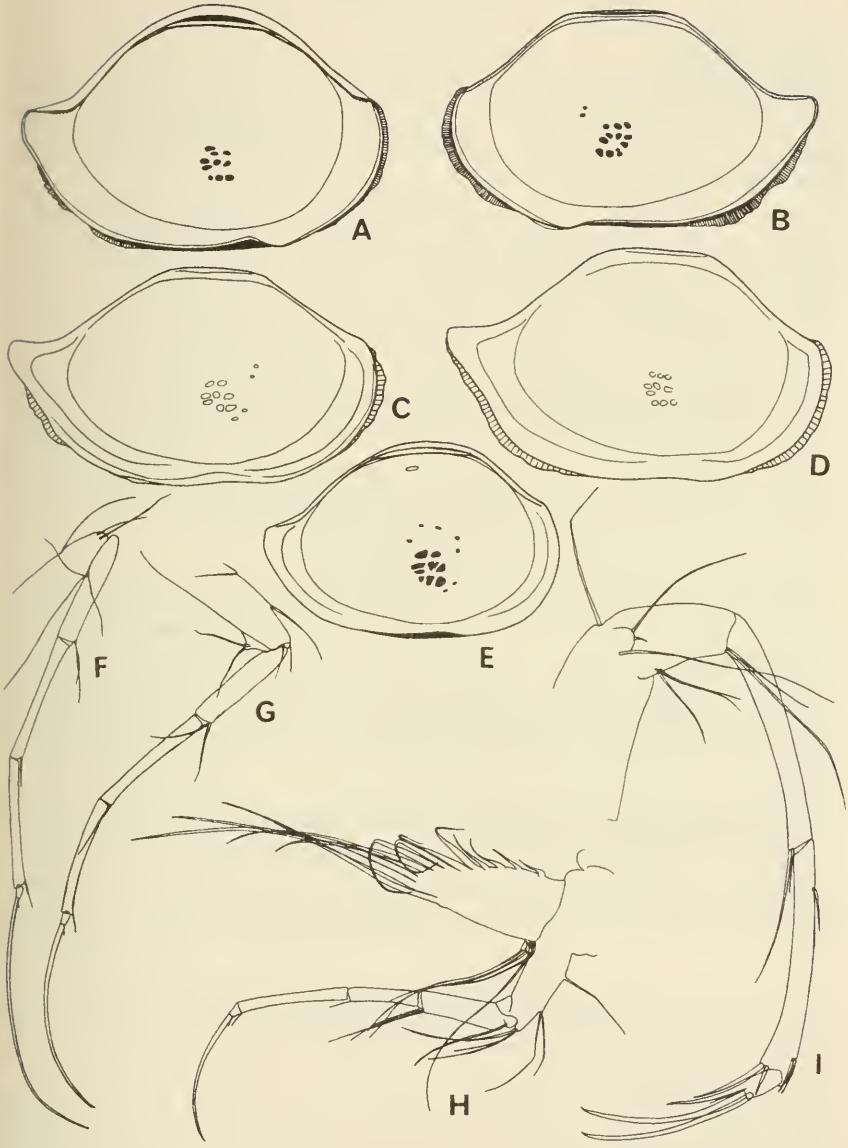

FIGURE 43.—*B.* (*Bairdoppilata?*) *hirsuta* (Brady): A,B,F–I, Female USNM 121353 from USNM Acc. No. 271766; C,D, subfossil valves from *Albatross* 2385; E, USNM 121354 from *Anton Bruun* 373J.

A,B,E, Carapace interiors; C,D, carapace exteriors; F, third thoracic leg; G, second thoracic leg; H, first thoracic leg; I, antenna. A–E, × 29; F–H, × 75; I, × 127.

Three subfossil specimens in material from *Challenger* station 24 at Culebra Island.

Subfossil specimens 581, from *Albatross* stations 2385, 2751, 2763, 2808, 4693, 4723, and 4728; and from *Anton Bruun* stations 360B, 361B, 363G, J, K, 365B, D, E, 366A, 369A, D, 370B, 373J, 397D, 399, 407, 409A.

Dimensions.—Adult female USNM 121353 from USNM Acc. No. 271766, left valve, length 1.68 mm, height 1.11 mm; right valve, length 1.70 mm, height 0.99 mm.

Left valve specimen USNM 121354 from *Albatross* 2808, length 1.33 mm, height 0.89 mm.

Distribution.—Described by Brady (1880) from the southeast Pacific; possibly reported as *Bairdia victrix* Brady by Brady (1880) from the West Indies, North Atlantic, Azores, off Brazil, Kerguelen Islands, Australia, and/or Tristan d'Acunha. Identified in the material under study from the southeast Pacific Ocean, Galapagos Archipelago, Caribbean Sea, Mississippi Delta, east of Rio de Janeiro, and Mozambique Channel; depth range 400–3475 meters.

Affinities.—This extremely abundant and widespread population probably includes more than one species and/or subspecies, but I can find no reliable criteria at present by which to establish consistent subgroups. There is some variability apparent in the length and position of the posterior caudate extension, as well as in the length and slope of dorsomedian outline of right valve and dorsal curvature of left valve.

The identification as *Bairdia hirsuta* Brady is based on the similarity of the few and poorly preserved specimens from *Albatross* localities in the southeast Pacific to the lectotype specimen from this same region. They are somewhat larger, more caudate, and show visible radial pore canals.

The southeast Pacific forms are quite similar in carapace shape to those from the Gulf of Mexico and Caribbean: these, in turn, cannot at present be distinguished from the rather variable population of the Mozambique Channel collections.

The *Bairdoppilata* identity is based on soft parts of the females collected living in the Gulf of Mexico, and on barely visible bairdoppilatan hinge dentition of subfossil specimens in this region. The antennae and thoracic legs of these females are most exceptionally long and thin but completely bairdoppilatan. Bairdoppilatan dentition is not visible on specimens from any other populations; possible explanations include generally poor preservation, low penetrance of this character, and misidentification of non-*Bairdoppilata* species with convergent carapace shape.

***Bairdoppilata* (*Bairdoppilata*) species 1**

FIGURE 41*i*, *j*

MATERIAL.—Two subfossil specimens at *Albatross* station 2808 off the Mississippi Delta.

DIMENSIONS.—Right valve USNM 121356, length 1.01 mm, height 0.67 mm; left valve USNM 121357, length 1.03 mm, height 0.72 mm.

AFFINITIES.—Shape externally identical to *Neonesidea* species 2 from Nosy Bé, Madagascar. The entirely smooth exterior and angulate lateral outline are unlike most other species of *Bairdoppilata*, to which it clearly belongs on the basis of hinge dentition. It is much smaller and less caudate than *B.* (*B.*?) *hirsuta* (Brady) and entirely lacks the marginal fringes of the latter. It is slightly larger than *B.* (*B.*) *cushmani* (Tressler) specimens from Bimini and is completely smooth, yet overall it is very similar to that form and may represent a much abraded, larger variety from deeper water.

***Bairdoppilata* (*Bairdoppilata*) species 2**

FIGURE 41*d–h*

MATERIAL.—A single adult male with dried appendages collected at *Anton Bruun* 412L.

DIMENSIONS.—Adult male USNM 121358, left valve, length 1.21 mm, height 0.77 mm; right valve, length 1.24 mm, height 0.62 mm.

AFFINITIES.—Despite the similarity in carapace outlines and the proximity of this station to Nosy Bé, Madagascar, this form cannot be identified with *B.* (*B.*) *alcyonicola*, new species. The carapace is much larger and is distinguished by exceedingly numerous very fine radial pore canals, smooth surface with very tiny punctae, and an extremely fine internal reticular mosaic structure in transmitted light. The copulatory organ is of quite different structure, having only a very short and stout copulatory tube.

***Bairdoppilata* (*Bairdoppilata*?) species 3**

FIGURE 27*e–h*

MATERIAL.—Subfossil specimens, 43 from *Anton Bruun* stations 361G, 363B, E, G.

DIMENSIONS.—Specimens from *Anton Bruun* station 36G: right valve USNM 121359, length 1.48 mm, height 0.94 mm; right valve USNM 121360, length 1.50 mm, height 0.92 mm; left valve USNM 121361, length 1.43 mm, height 1.00 mm; left valve USNM 121362, length 1.44 mm, height 0.96 mm.

DISTRIBUTION.—Southern Mozambique Channel, depth 1860–2980 m.

Affinities.—Bairdoppilatan dentition is present although too fine to be drawn to scale. Otherwise the species is not sufficiently distinctive to be named at this time.

Bairdoppilata (*Glyptobairdia*) Stephenson, 1946

Glyptobairdia Stephenson, 1946, p. 345.—not Pokorný, 1958, p. 226.

Type-species.—*Bairdia coronata* Brady, 1870, p. 243, pl. 32: fig. 9 (=*Glyptobairdia bermudezi* Stephenson, 1946, p. 346, pl. 43, figs. 1–3).

Diagnosis.—Carapace externally ornamented with ridges and pitting. Hinge very robust, with crenulate groove and raised terminal teeth in right valve, incised crenulate bar and sockets in left valve; anterior and posterior segments with auxiliary bairdoppilatan denticles and sockets conspicuously developed. Appendages as in *B.* (*Bairdoppilata*).

Affinities.—*Glyptobairdia* has for some years been considered as a subjective synonym of *Triebelina* but is technically available.This name is resurrected here to emphasize and express more accurately the uniqueness and bairdoppilatan affinity of *Bairdia coronata* Brady, the type-species and at present the only Recent species assignable to this subgenus.

Bairdoppilata (*G.*) *coronata* (Brady) resembles *Triebelina* in such characters as carapace robustness, external ornament, outline, and marginal denticles; however, it differs conspicuously in hingement, muscle-scar pattern, and appendage characters, which are those of *Bairdoppilata*. It seems to be the only living species of a morphologic type that is represented as early as the Triassic by such genera as *Carinobairdia*. Kollmann (1960, 1963) stated that *Glyptobairdia* should be revived for the Recent representative of a lineage that is distinct from and has coexisted with the *Triebelina* lineage at least since the Rhaetian. Unfortunately, the hingement of these Triassic species has not been described, but the exterior ornament is clearly related to that of *B.* (*G.*) *coronata*.

Bairdoppilata (*Glyptobairdia*) *coronata* (Brady), 1870

Figure 44*a–g*

Bairdia coronata Brady, 1870, p. 243, pl. 32: fig. 9.

Triebelina coronata (Brady) of Stephenson, 1947, p. 578.—Puri, 1963, p. 131, pl. 6: figs. 1, 2.—Morkhoven, 1958, p. 366, pl. 46: figs. 1–6.—Rome, 1960, pp. 1–14.

Glyptobairdia bermudezi Stephenson, 1946, p. 346, pl. 42, figs. 1–3.

Material.—One male and two females living in Andros sample 34 from the Bahamas; known also from personal collections on the south shore of Bermuda.

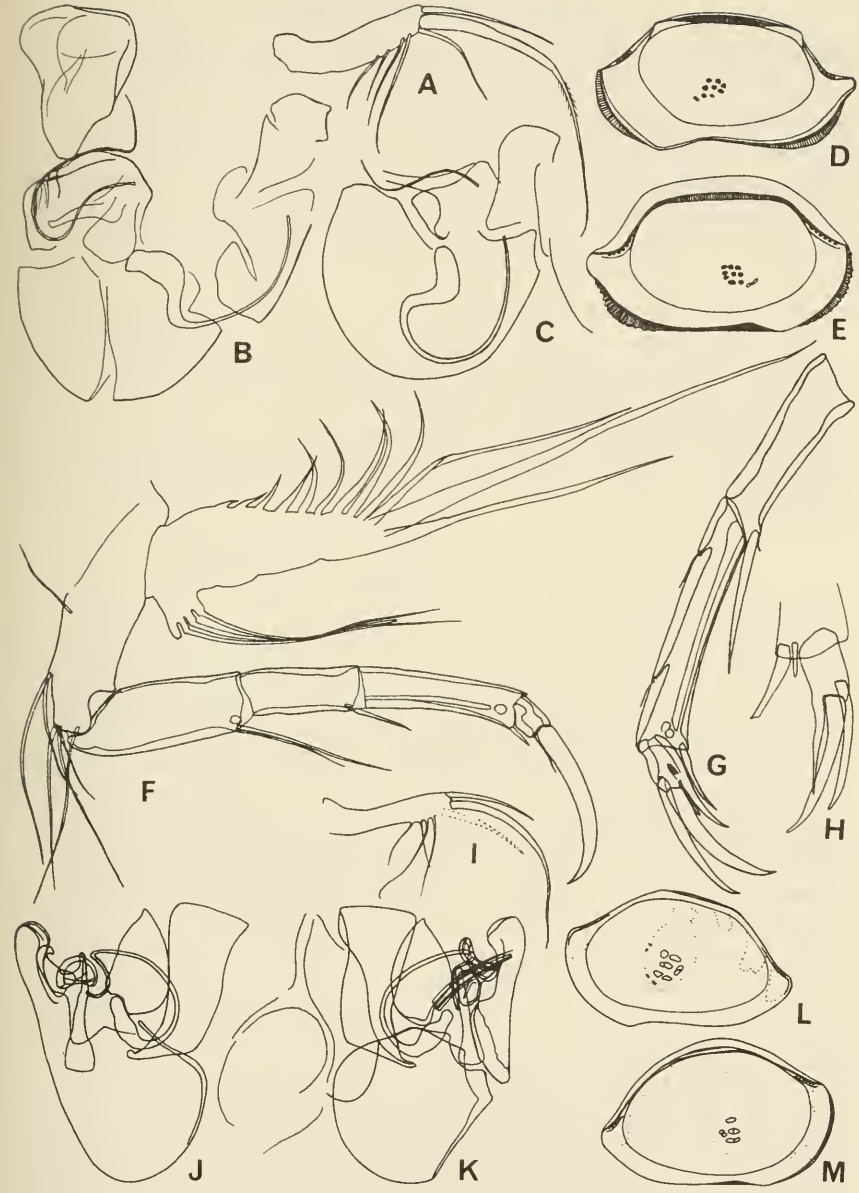

FIGURE 44.—*Bairdoppilata* (*Glyptobairdia*) *coronata* (Brady): A–C,F,G, Male USNM 121364; D,E, female USNM 121363. *B.* (*Bairdoppilata*) *cushmani* (Tressler): H, Female holotype specimen 122B–3 of *B. carinata* Kornicker; I–M, Male USNM 121334 from Bimini.

A,I, Furcae; B,C,J,K, copulatory organs; D,E,L,M, carapace interiors; F, first thoracic leg; G,H, antennae. A–C,F–H, × 301; D,E, × 50; I–K, × 152; L,M, × 29.

Dimensions.—Adult female USNM 121363, left valve, length 0.74 mm, height 0.43 mm; right valve, length 0.73 mm, height 0.38 mm.

Habitat.—In the Bahamas and Bermuda collections, *B.* (*G.*) *coronata* is characteristic of the coral reef front rather than the quieter lagoonal or back-reef environments. This close association with the coral masses themselves rather than subsidiary biotic microhabitats duplicates the known distribution of *Triebelina sertata* on reefs at Nosy Bé, Madagascar. Thus the similarity of carapace exteriors of *Triebelina* and *Glyptobairdia* represents convergence due to similar habitat rather than phyletic affinity.

Affinities.—No other ornamented species of *Bairdoppilata* are known. The Triassic genus *Medwenitschia* Kollmann bears a geometrically similar pattern of ridges.

Remarks.—Rome (1960) has described the appendages of this species in some detail; only the most significant characters are reillustrated here.

BYTHOCYPRIDINAE, new subfamily

Type-genus.—*Bythocypris* Brady, 1880, p. 45.

Diagnosis.—Carapace usually thin, smooth, cyprid in aspect; hinge weak; adductor scars arranged in an anterior row of three horizontal scars plus one posteroventral scar, all scars may be divided but not separated; frontal, mandibular, and dorsal scars usually conspicuous.

Antennules with robustly proportioned podomeres, setae no longer than podomere sequence; antennae stout with podomere 6 having a simple stout distal claw and several smaller simple setae, none fused; maxilla with 6–10 unfeathered setae on posteroventral platelet; first thoracic leg of male sometimes slightly reflexed; vibratory plate of first thoracic leg oval, with 4–15 unfeathered setae and few feathered setae; furca with 3–7 setae; genital lobe of female with oval chamber and uncoiled tube; brush-shaped organ of male with sides equally long.

Affinities.—Some species in this subfamily have podomere proportions that recall those of juveniles in the Bairdiinae. In podomere fusion and proportions, setae counts and structure, vibratory plates, and many other characters this group retains flexibility of morphologic expression where the homologous structures of the Bairdiinae have become fixed in a rigid pattern. The tendency toward reflexion possible in some males and the conspicuous dorsal muscle scars are properties characteristic of Cypridacea; otherwise all soft-part affinities of this group are bairdiid. Juveniles of some species have a frustrating capacity for developing a calcified inner lamella and other marginal structures comparable to though not as strongly developed as those of the adult; to my knowledge, such a phenomenon is known elsewhere only in the family Macrocyprididae of the Cypridacea.

Bythocypris Brady, 1880

Bythocypris Brady, 1880, p. 45.—Brady and Norman, 1889, p. 119.—Müller, 1894, p. 275.—Sars, 1923, p. 6.—Morkhoven, 1963, p. 37.

Type-species.—*Bythocypris reniformis* Brady, 1880, p. 46, pl. 5, fig. 1a–l.

Diagnosis.—Carapace moderately robust, smooth, lateral outline oblong to subreniform, cyprid in aspect; muscle-scar pattern an anterior row of 3 scars plus one posteroventral scar, scars often divided.

Antennule with setae no longer than total of podomeres, antennae relatively stout, podomere 6 with long distal claw and 3 or 4 smaller setae; vibratory plate of first thoracic leg oval, with 6–15 long unfeathered setae and 5 or more shorter feathered setae; furca with 3 long setae and 3 or 4 shorter setae; maxillar plate with 8–10 unfeathered posteroventral setae.

Included species.—Recent species whose soft parts have been described, listed by original binomen:

Bythocypris reniformis Brady, 1880
Bairdia bosquetiana Brady, 1866
?*Bairdia complanata* Brady, 1867
Bairdia obtusata Sars, 1866
Bythocypris eltanina, new species
Bythocypris spiriscutica, new species

Recent species assigned to *Bythocypris* on carapace features only include:

Bairdia abyssicola Brady, 1880
Bairdia affinis Brady, 1886
Bythocypris (?) *compressa* Brady, 1880
Bythocypris elongata Brady, 1880
Bairdia folini Brady, 1886
?*Bythocypris laeva* Puri, 1953
Bythocypris lucida Seguenza of Ascoli, 1964
Bythocypris mozambiquensis, new species
Bythocypris prolata, new species

Affinities.—The soft parts of *Bythocypris* retain flexibility of morphology in several characters where the comparable structure in species of "*Bairdia*" is of a rigidly established type. This greater variability renders the genus difficult to diagnose but easy to recognize. This difficulty is compounded by current ignorance of the male soft-part anatomy; the males described below for two new species represent the first males known in *Bythocypris*.

The thin-shelled abyssal forms described below differ somewhat in appendage structures as well and perhaps should be separated as another taxon. The distinction between *Bythocypris* and *Zabythocypris* is chiefly one of degree.

Remarks.—Many fossil and a few Recent species have been misassigned to *Bythocypris* because of insufficient attention to muscle-scar pattern. For example, *Bythocypris actites* Benson, 1959 (USNM 113120, 113121) is a *Krithe*, as are the specimens identified by Tressler (1941) as *Bythocypris obtusata* Sars (USNM 153749, 153748) and *Bythocypris bosquetiana* (Brady) (USNM 153746, 153747).

Bythocypris reniformis Brady, 1880

Figure 45*j–m*

Bythocypris reniformis Brady, 1880, p. 46, pl. 5: fig. 1a–l.—?Chapman, 1941, p. 195.

Diagnosis.—Carapace relatively robust, moderately inflated, all outlines gently curved; left valve with straight ventral margin, broadly and nearly equally rounded anterior and posterior margins, broadly arched dorsal margin highest at midpoint, nearly symmetrical in lateral view; right valve not as high, ventral margin gently indented, dorsal margin only slightly arched, anterior margin broadly rounded, posterior region obliquely rounded with steeply sloping posterodorsal margin; radial pore canals and false pore canals abundant and quite long; muscle scars and normal pore canals conspicuous as opaque areas on otherwise transparent carapace.

Material.—Lectotype and two syntype specimens in *Challenger* slide no. 123, British Museum (Nat. Hist.) cat. no. 80.38, from station 24, north of St. Thomas I., at 390 fms.

Seven subfossil valves in additional sediment from *Challenger* 24.

Subfossil specimens, 108 from *Anton Bruun* stations 363L, 410A, 413B, and especially 365D; 75 subfossil specimens from *Albatross* station 2763.

Distribution.—Identified by Brady (1880) from *Challenger* stations off St. Thomas (Culebra) Island at 390 fms, off North Brazil at 675 and 350 fms, off Prince Edward Island at 50–150 fms; by Chapman (?) from southeast Australia at 505 and 470 fms.

Abundant near Tulear, Madagascar, and elsewhere on the western Madagascar coast to depths of 3100 m. Extremely abundant in *Albatross* station 2763, south of Rio de Janeiro, at 1227 m.

Dimensions.—Left valves from *Anton Bruun* 365D: USNM 121366, length 1.11 mm, height 0.62 mm; USNM 121367, length 1.14 mm, height 0.66 mm; USNM 121368, length 1.20 mm, height 0.71 mm; USNM 121369, length 1.11 mm, height 0.62 mm.

Right valves from *Anton Bruun* 365D: USNM 121370, length 0.98 mm, height 0.53 mm; USNM 121371, length 1.07 mm, height 0.61 mm; USNM 121372, length 1.09 mm, height 0.59 mm; USNM 121377, length 1.20 mm, height 0.64 mm.

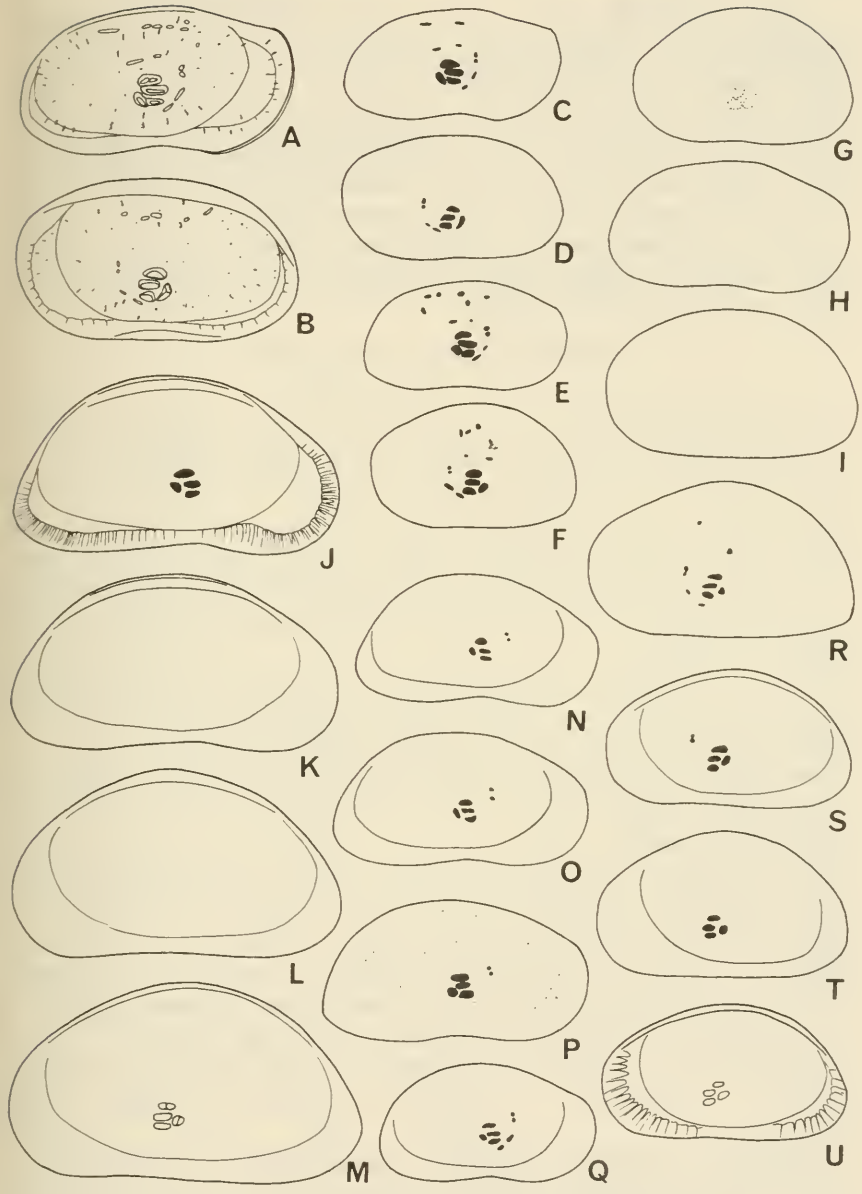

FIGURE 45.—*Bythocypris affinis affinis* (Brady): A–D. *B. affinis madagascarensis*, n subsp.: E,F, Typical form; G, variant A; H,I, variant B. *B. reniformis* Brady: J–M Specimens from *Albatross* 2763; N–U, specimens from *Anton Bruun* 365D.

All USNM: A–D, 121380; E, 121381; F, 121382; G, 121384; H,I, 121386; J, 121373; K, 121374; L, 121375; M, 121376; N, 121371; O, 121372; P, 121377; Q, 121370; R, 121368; S, 121369; T, 121367; U, 121366. All exterior views. A,B, × 37; C–U, × 29.

Right valves from *Albatross* 2763: USNM 121373, length 1.48 mm, height 0.80 mm; USNM 121374, length 1.49 mm, height 0.79 mm.

Left valves from *Albatross* 2763: USNM 121375, length 1.51 mm, height 0.86 mm; USNM 121376, length 1.62 mm, height 0.90 mm.

Affinities.—Specimens of the Tulear population are larger and rather higher than those from St. Thomas Island; the right valve is also slightly more broadly rounded posteriorly and hence less symmetrical in lateral view. Specimens from *Albatross* 2763 are very much larger than either the St. Thomas or Tulear populations but are essentially identical in shape.

Bythocypris elongata Brady, 1880

Figure 46*a*, *b*

Bythocypris elongata Brady, 1880, p. 47, pl. 6: fig. 1a–c.—?Chapman, 1910, p. 428.—?Key in van Andel and Postma, 1954, p. 219, pl. 3: fig. 11.
Not *Bythocypris elongata* LeRoy, 1943, p. 358.

Diagnosis.—Carapace twice as long as high, rather compressed and thin. Ventral margin nearly straight, posterodorsal margin straight and sloping steeply, dorsomedian margin nearly straight, anterodorsal margin straight and sloping gently, intersections of marginal sections obscurely angulate.

Material.—Lectotype specimen in *Challenger* slide 124, British Museum (Nat. Hist.) cat. no. 157, a single right valve from *Challenger* station 325, north of Tristan d'Acunha, at 1425 fms depth.

Specimens, 22 at *Anton Bruun* stations 361B, G, H, 363E, K, 367G, 368C, 369A, 409A, 413 from the Mozambique Channel, all apparently juveniles.

Distribution.—Described by Brady (1880) from 1425 fms depth north of Tristan d'Acunha. Reported by Chapman (1910) at 1050 fms near Fiji; by Key (1954) in the Gulf of Paria at much shallower depths (4 to 152 m). Recorded in the present study from 11 stations in the south-central portion of the Mozambique Channel, at depths ranging from 400 to 3750 meters and usually below 1190 m.

Dimensions.—Juvenile (?) specimen USNM 121379, left valve, length 1.71 mm, height 0.81 mm; right valve, length 1.70 mm, height 0.71 mm.

Affinities.—The specimen figured by Key (1954) is somewhat less elongate and more highly arched dorsally. The *Anton Bruun* specimens are identical in shape to the *Challenger* lectotype.

Bythocypris affinis (Brady), 1886

Bythocypris affinis affinis (Brady), 1886

Figure 45*a–d*

Bairdia affinis Brady, 1886, p. 195, pl. 14: figs. 6–7.—Brady and Norman, 1889, p. 242.

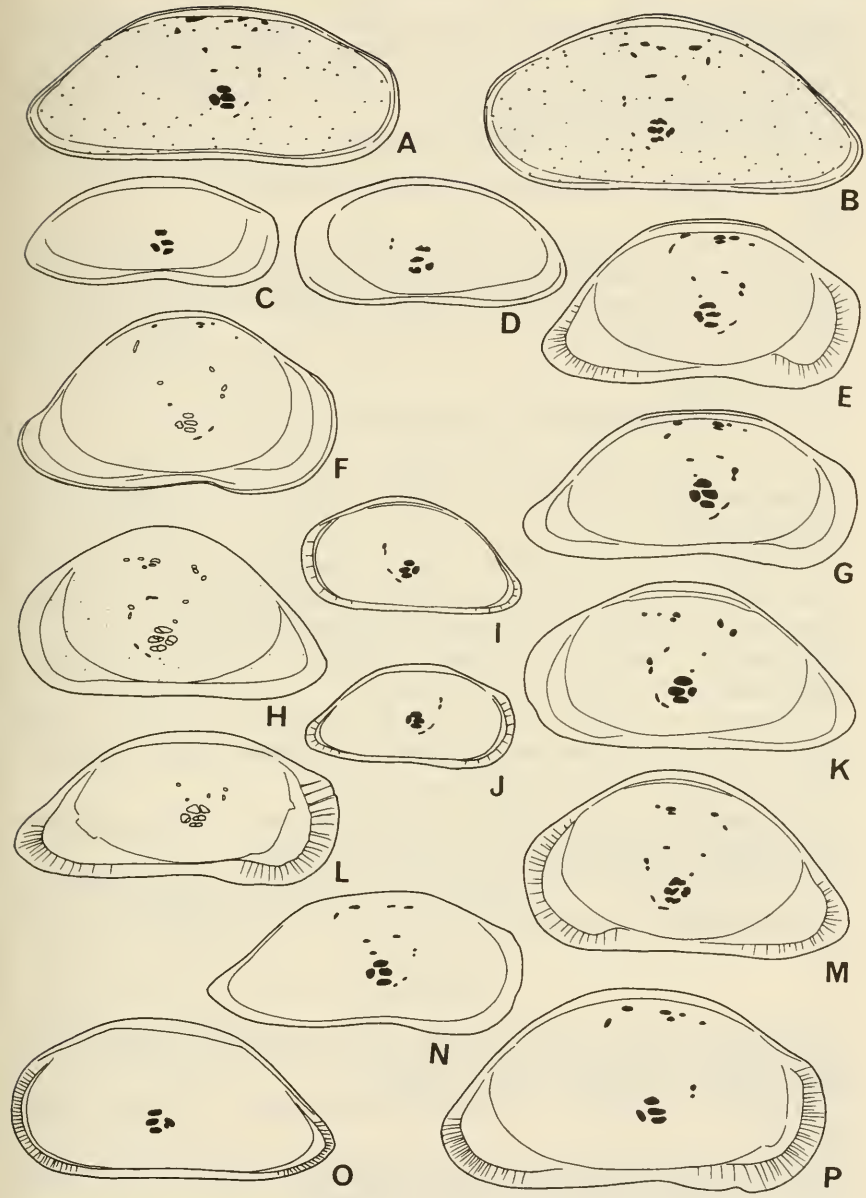

FIGURE 46.—*Bythocypris elongata* Brady: A,B, *B. prolata*, n. sp.: C,D, *B. mozambiquensis*, n. sp.: E,G,K,M, typical form; I,J,L, variant B; F,H, variant C; P, variant D; N, variant E; O, variant F.

All USNM: A,B, 121379; C, 121389; D, 121388; E, 121602; F, 121611; G, 121603; H, 121610; I, juvenile 121609; J, juvenile 121608; K, 121601; L, adult 121607; M, USNM 121600; N, 121614; O, 121615; P, 121612. All exterior views. All × 29.

DIAGNOSIS.—Height/length ratio=0.56, length about 1.03 mm, carapace outline oblong with nearly straight dorsal margins.

MATERIAL.—Subfossil specimens, 130 from *Albatross* stations 2763, 2751, 2383, 2385, 2392, 3375.

DIMENSIONS.—USNM 121380 from *Albatross* 3375, left valve, length 1.03 mm, height 0.58 mm; right valve, length 1.00 mm, height 0.53 mm.

DISTRIBUTION.—North Atlantic; south of Rio de Janeiro, east Caribbean Basin, and Mississippi Delta; depths from 1227 to 2160 m.

REMARKS.—Described from a single specimen collected at 1918 m depth by the *Talisman*, July 7, 1883, in the North Atlantic off North Africa (Brady 1886).

Bythocypris affinis madagascarensis, new subspecies

FIGURE 45*e*, *f*

TYPE-SPECIMENS.—Holotype USNM 121382; paratypes USNM 121381, 121383.

TYPE-LOCALITY.—*Anton Bruun* cruise 7 station 373J.

DIAGNOSIS.—Height/length ratio=0.60 mm, length about 0.93 mm, dorsal margin of left valve gently but distinctly arched.

MATERIAL.—Subfossil specimens, 24 from *Anton Bruun* stations 363K, 365D, 369J, 370B, 373J, 399, 407.

DIMENSIONS.—Right valve USNM 121381 from *Anton Bruun* 373J, length 0.92 mm, height 0.50 mm. Left valve USNM 121382 from same station, length 0.93 mm, height 0.56 mm.

DISTRIBUTION.—Mozambique Channel between Tulear and Lourenço Marques, at depths between 880 and 1190 m.

AFFINITIES.—Specimens deviating somewhat from the general form of this population are assigned below to "variant" A and B.

Variant A

FIGURE 45*g*

MATERIAL.—Two specimens from *Anton Bruun* station 369G in the Mozambique Channel at 1205 m. depth.

DIMENSIONS.—USNM 121384, left valve, length 1.04 mm, height 0.63 mm.

AFFINITIES.—These specimens are larger and dorsally more rounded than the general population of this subspecies.

Variant B

FIGURE 45*h*, *i*

MATERIAL.—Ten specimens from *Anton Bruun* stations 363B and 368C in the Mozambique Channel at depths of 2980 and 2995 m.

Dimensions.—USNM 121386, left valve, length 1.14 mm, height 0.67 mm; right valve, length 1.09 mm, height 0.59 mm.

Affinities.—These specimens are considerably larger and less angulate in outline than the general population of this subspecies.

Bythocypris prolata, new species

Figure 46*c,d*

Etymology.—Latin *prolatus*, extended, elongated.

Type-specimens.—Holotype USNM 121388; paratypes USNM 121389–121390.

Type-locality.—*Anton Bruun* cruise 7 station 380C.

Diagnosis.—Carapace of similar structure to *B. reniformis* Brady but much more elongate, with broadly and evenly rounded anterior margin, very gently arched dorsal margin, only slightly indented ventral margin, posterodorsal margin sloping steeply to obscurely angulate slightly upswung posteroventral termination; lacking any straight or concave segments of dorsal margin.

Material.—Specimens, 35 from *Anton Bruun* stations 380 A, C at Walterson Shoal, south of Madagascar, at 935 and 950 m.

Dimensions.—Left valve USNM 121388, length 1.25 mm, height 0.59 mm. Right valve USNM 121389, length 1.15 mm, height 0.50 mm.

Bythocypris eltanina, new species

Figures 47, 48, 49*a-d*

Etymology.—For the USNS *Eltanin*, whose cruises in the southeast Pacific and Antarctic regions have contributed valuable collections of abyssal and antarctic ostracodes.

Type-specimens.—Holotype male USNM 121391; allotype female USNM 121392; paratypes USNM 121393–121394.

Type-locality.—*Eltanin* station 1248.

Diagnosis.—Carapace nearly equivalved, moderately inflated, outlines as described for *Bairdia folini* Brady, adductor muscle scars divided; narrow fused marginal zone with abundant straight radial pore canals.

Distal podomere of male antenna with very short fused seta, other shorter distal setae, thick segmented sensory (?) club; vibratory plate of first thoracic leg with 6 long unfeathered setae, 6 other nearly vestigial setae; furca with 6 setae, setae 2 and 4 very long, setae 1, 3, and 5 shorter, seta 6 shortest; copulatory organ oval in outline with broadly curved copulatory tube and long flexible extension.

Material.—Four specimens living at Eltanin stations 1248 and 1250.

FIGURE 47.—*Bythocypris eltanina*, n. sp.: A,B, Male USNM 121391; C,D, female USNM 121392.

A, Antennule; B, antenna; C, maxilla; D, mandible. A, × 127; B–D, × 301.

DIMENSIONS.—Adult male USNM 121391, left valve, length 1.46 mm, height 0.77 mm; right valve, length 1.45 mm, height 0.70 mm.

Adult female USNM 121392, left valve, length 1.40 mm, height 0.75 mm; right valve, length 1.40 mm, height 0.72 mm.

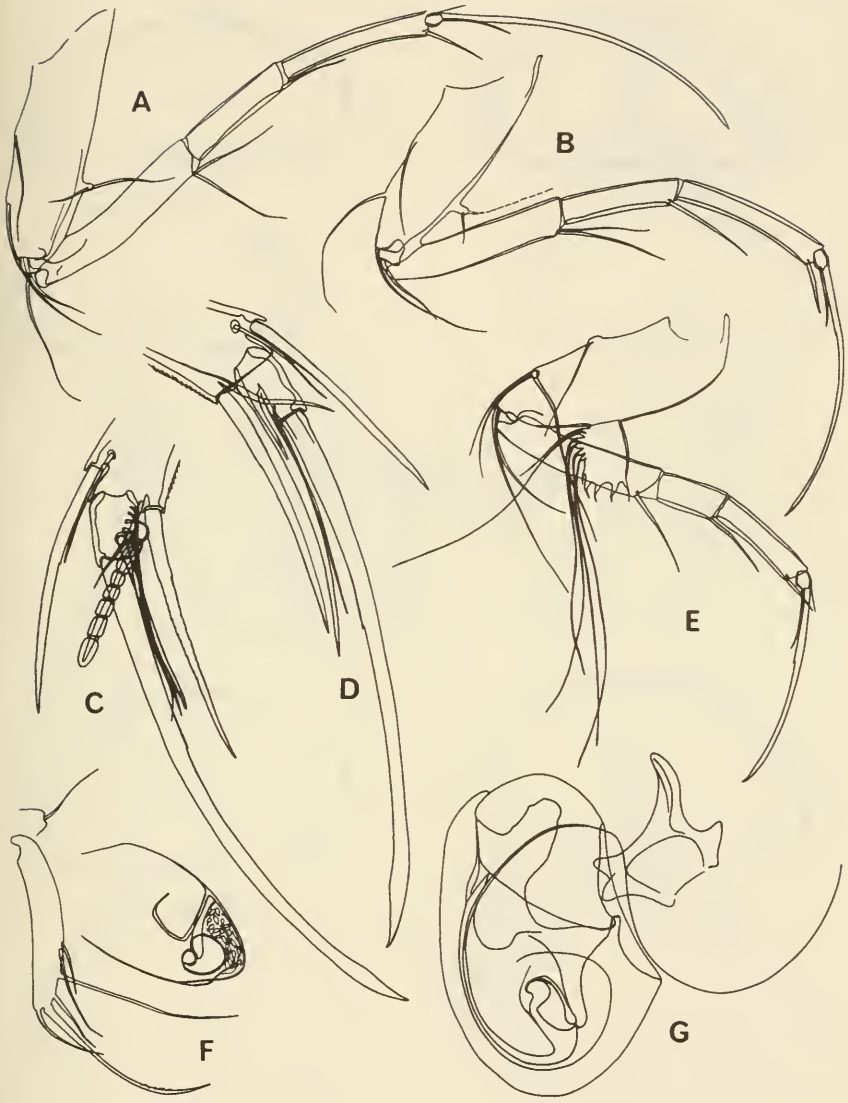

FIGURE 48.—*Bythocypris eltanina*, n. sp.: A,B,E, Female USNM 121393; C,G, male USNM 121391; D.F. female USNM 121392.

A, Third thoracic leg; B, second thoracic leg; C,D, antennal claws; E, first thoracic leg; F, genital lobe and furca; G, copulatory organ. A,B,E–G, × 152; C,D, × 301.

AFFINITIES.—Carapace very similar in outlines and muscle-scar pattern to that illustrated for *Bairdia folini* Brady (1886, p. 195, pl. 14: figs. 4, 5; Brady and Norman, 1889, p. 242). The length of the latter species is given as 1.75 mm; the soft parts are not known, but it apparently is a closely related species of *Bythocypris*.

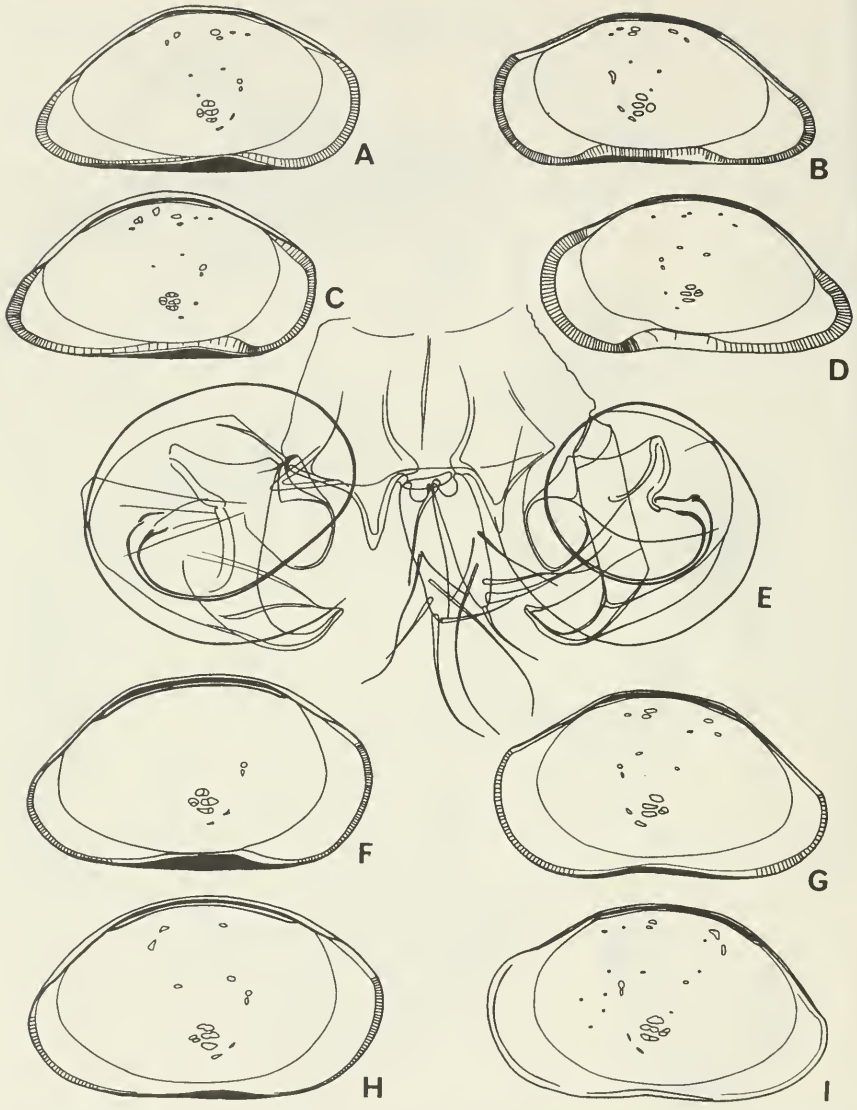

FIGURE 49.—*Bythocypris eltanina*, n. sp.: A,B, Male USNM 121391; C,D, female USNM 121392. *B. spiriscutica*, n. sp.: E–G, Male USNM 121395; H,I, female USNM 121396. A–D,F–I, Carapace interiors, × 29; E, copulatory organ and furca, × 127.

Bythocypris spiriscutica, new species

FIGURES 49*e–i*, 50, 51

ETYMOLOGY.—Latin *spira*, coil + *scutica*, whip, lash.

TYPE-SPECIMENS.—Holotype male USNM 121395; paratypes USNM 121396, 121397.

FIGURE 50.—*Bythocypris spiriscutica*, n. sp.: A–C, Male USNM 121395; D, female USNM 121396.

A, Antennule; B,C, antennae; D, mandible. A,B, × 127; C, × 301; D, × 152.

TYPE-LOCALITY.—*Eltanin* station 1248.

DIAGNOSIS.—Carapace much inflated, lateral outlines nearly oval with minimal posterodorsal concavity, dorsal outline bluntly rounded at anterior and posterior ends.

Male antenna with long distal claw, 3 shorter setae, and thick segmented rod; vibratory plate of first thoracic leg with 15 long un-

FIGURE 51.—*Bythocypris spiriscutica*, n. sp.: Female USNM 121396.
A, First thoracic leg; B, third thoracic leg; C, second thoracic leg; D, maxillar palp and processes; E, maxilla. A–C, × 127; D,E, × 152.

feathered setae and 6 shorter setae; copulatory organ with hemioval basal part, scoop-shaped distal part, and long spirally coiled copulatory tube.

DIMENSIONS.—Adult male USNM 121395, left valve, length 1.55 mm, height 0.88 mm; right valve, length 1.50 mm, height 0.86 mm.

Adult female USNM 121396, left valve, length 1.60 mm, height 0.92 mm; right valve, length 1.53 mm, height 0.89 mm.

MATERIAL.—Specimens, 34 living at *Eltanin* station 1248.

Bythocypris mozambiquensis, new species

FIGURES 46*e–o*, 52, 53

ETYMOLOGY.—From the Mozambique Channel, where the species is known to live.

TYPE-SPECIMENS.—Holotype USNM 121600; paratypes 121601–121616.

TYPE-LOCALITY.—*Anton Bruun* cruise 7 station 361G.

DIAGNOSIS.—Carapace quite robust, left valve rather higher than left and of different lateral outline, with broadly arched dorsum and nearly triangular outline overall, lacking concave segments; right valve with more sinuous outline, with straight dorsomedian and concave anterodorsal and posterodorsal segments and distinctly caudate posteroventral area. Fused marginal zone rather broad with straight radial pore canals.

MATERIAL.—Of the typical form, 77 subfossil specimens collected at *Anton Bruun* stations 360B, 361G, 363B, D, K, 366C, 367A, G, 368C, 369D, G, J.

Of variant A, 2 living females (?) at *Anton Bruun* stations 368C and 416A; probably some subfossil specimens included in the counts for the typical form.

Of variant B, 11 subfossil specimens from *Albatross* stations 4693 and 2385.

Of variant C, 5 subfossil specimens at *Anton Bruun* station 410A; one living female at *Anton Bruun* station 363D.

Of variant D, 4 subfossil specimens at *Anton Bruun* station 361G.

Of variant E, 2 subfossil specimens at *Albatross* station 4728.

Of variant F, 4 subfossil specimens at *Albatross* station 4723.

DIMENSIONS.—For the typical form; specimens from *Anton Bruun* station 361G: Left valve USNM 121601, length 1.00 mm, height 0.52 mm; left valve USNM 121600, length 1.49 mm, height 0.83 mm; right valve USNM 121602, length 1.42 mm, height 0.75 mm; right valve USNM 121603, length 1.50 mm, height 0.70 mm.

Variant A: Adult female (?) USNM 121605, left valve, length 1.22 mm, height 0.68 mm; right valve, length 1.24 mm, height 0.62 mm. USNM 121606, right valve, length 1.23 mm, height 0.61 mm.

Variant B: Adult right valve USNM 121607, length 1.47 mm, height 0.69 mm. Juvenile right valve USNM 121608, length 0.95 mm, height 0.47. Juvenile left valve USNM 121609, length 1.00 mm, height 0.52 mm.

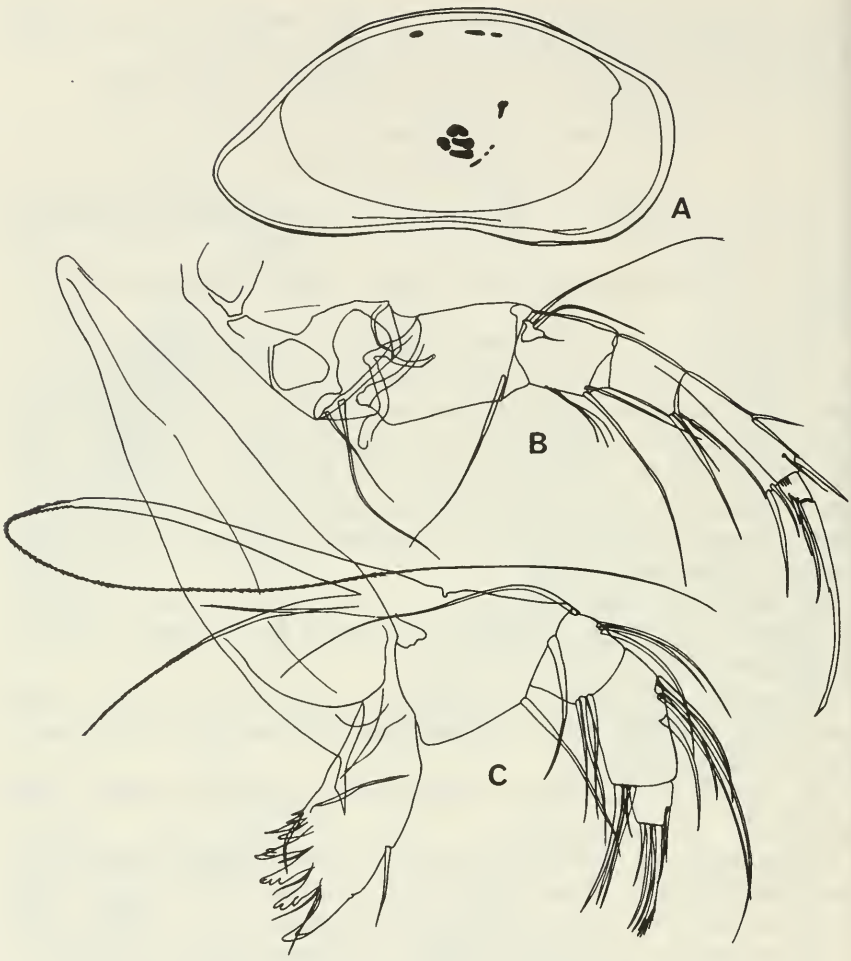

FIGURE 52.—*Bythocypris mozambiquensis*, n. sp.: Variant A, female USNM 121606. A, Left valve exterior, × 49; B, antenna, × 152; C, mandible, × 301.

Variant C: USNM 121610, left valve, length 1.40 mm, height 0.77 mm. USNM 121611, right valve, length 1.45 mm, height 0.83.

Variant D: Right valve USNM 121612, length 1.75 mm, height 0.92 mm. Left valve fragment USNM 121613, length 1.76 mm.

Variant E: Right valve USNM 121614, length 1.42 mm, height 0.64 mm.

Variant F: Left valve USNM 121615, length 1.47 mm, height 0.72 mm.

AFFINITIES.—There is an extraordinary amount of variation among forms assignable to this species, but the differences seem to be very minor changes in proportions and size that are not sufficiently

FIGURE 53.—*Bythocypris mozambiquensis*, n. sp.: Variant A, female USNM 121606.
A, Antennule; B, maxilla; C, first thoracic leg; D, third (?) thoracic leg; E, basal podomere of second (?) thoracic leg. A,C–E, × 152; B, × 301.

clear-cut to be named. The appendages of the two living specimens, here termed variant A, appear to be fully mature, although no genitalia are observable. Their carapaces are identical in size and shape to supposed juveniles in the subfossil assemblages; their inner lamellae are present but very thin.

Zabythocypris, new genus

Etymology.—Greek *za-*, very, +*Bythocypris*.

Type-species.—?*Bythocypris heterodoxa* Chapman, 1910, p. 429, pl. 56, fig. 20a, b.

Diagnosis.—Carapace very much compressed, in lateral outline subcircular to angularly suboval, left valve very much higher than right valve; fused marginal zone wide with straight radial pore canals; muscle-scar pattern bythocypridine.

Male antenna without segmented sensory club, all distal setae short; vibratory plate of first thoracic leg with 4 proximally segregated featherless setae, 10 other setae of similar length, podomeres and distal claw capable of being bent into a recurved hook; copulatory organ without distinguishable copulatory tube; furca with 7 setae, setae 2 and 4 longest.

Species included.—Recent species, by original binomen:

Bairdia exaltata Brady, 1880
?*Bythocypris heterodoxa* Chapman, 1910
Zabythocypris ancipita, new species
Zabythocypris helicina, new species

Affinities.—This genus is most similar to the Bairdiinae of any of the Bythocypriinae in the relatively consistent soft-part anatomy.

Ecology.—A characteristic form at abyssal depths.

Zabythocypris heterodoxa (Chapman), 1910

Figures 56*a-c*, 57, 58

?*Bythocypris heterodoxa* Chapman, 1910, p. 429, pl. 56: fig. 20a, b.

Material.—A single adult male USNM 121617 collected living at *Anton Bruun* cruise 11 station 95, west of Peru.

A single adult valve of a more elongate and angulate form at *Anton Bruun* cruise 8 station 410A in the Mozambique Channel.

A fragmentary valve at *Albatross* station 2385 southeast of the Mississippi Delta.

Dimensions.—Adult male USNM 121617, left valve, length 1.79 mm, height 1.20 mm.

Left valve USNM 121618, length 1.20 mm, height 0.95 mm.

Distribution.—Chapman (1910) originally described this species from three locations south of Funafuti at depths between

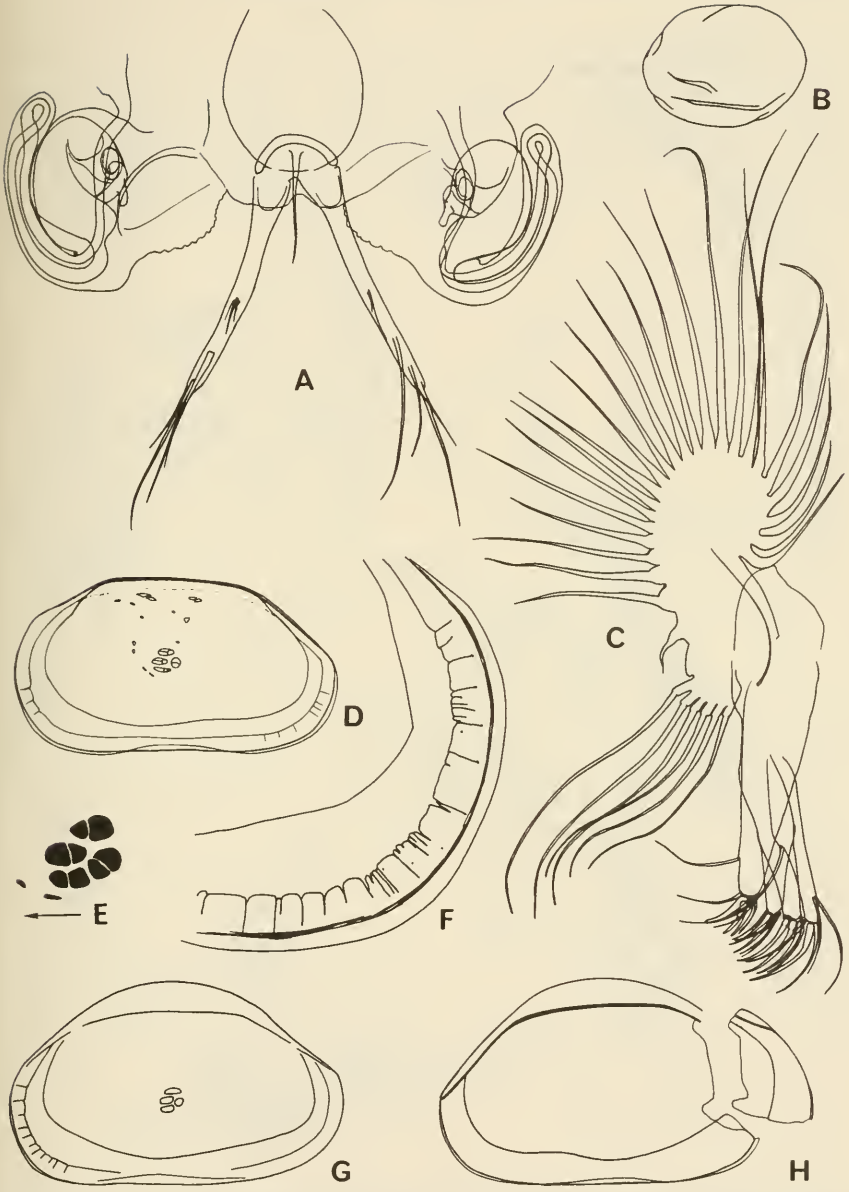

FIGURE 54.—*Zabythocypris helicina*, n. sp.: A–F,H, Female USNM 121625; G, male (?) specimen USNM 121626.

A, Genital lobe and furca; B, egg; C, maxilla; D,H, carapace interiors; E, left interior muscle-scar pattern; F, right valve anterior margin, exterior view; G, left exterior. A,C, × 152; B, × 127; D, ×29; E, × 75; F–H, × 43.

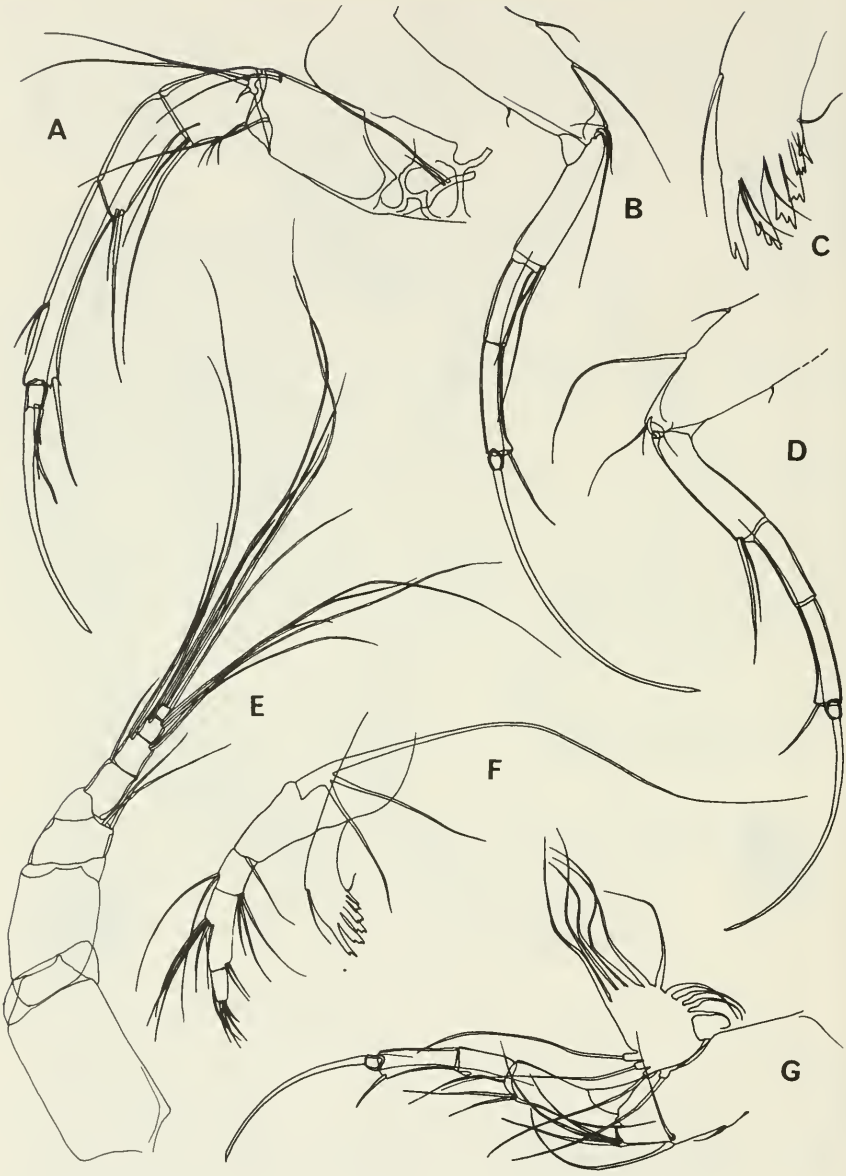

FIGURE 55.—*Zabythocypris helicina*, n. sp.: Adult female USNM 121625.
A, Antenna; B, third thoracic leg; C,F, mandible; D, second thoracic leg; E, antennule; G, first thoracic leg. A,B,D–G, × 127; C, × 301.

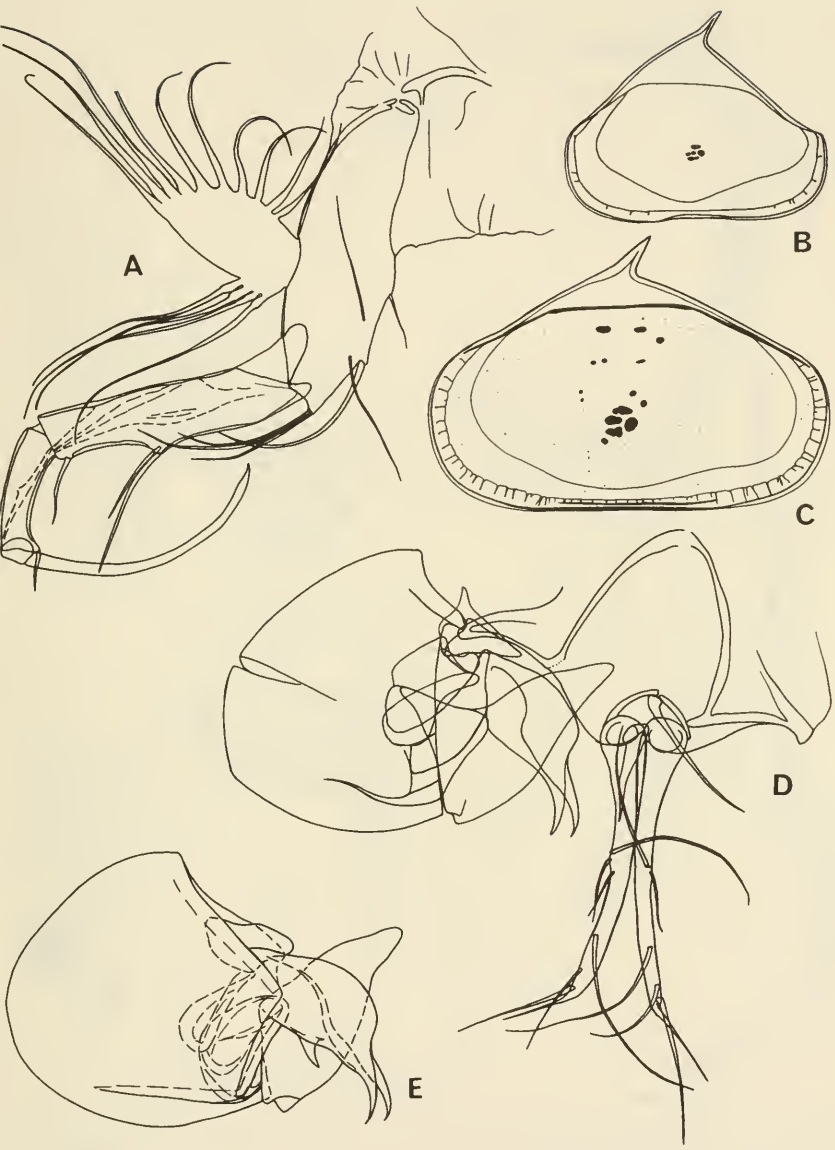

FIGURE 56.—*Zabythocypris heterodoxa* (Chapman); A,C–E, Male from *Anton Bruun* cruise 11 station 95, USNM 121617; B, USNM 121618 from *Anton Bruun* cruise 8 station 410A. A, First thoracic leg, × 127; B,C, carapace exteriors, × 29; D,E, copulatory organ and furca, × 127.

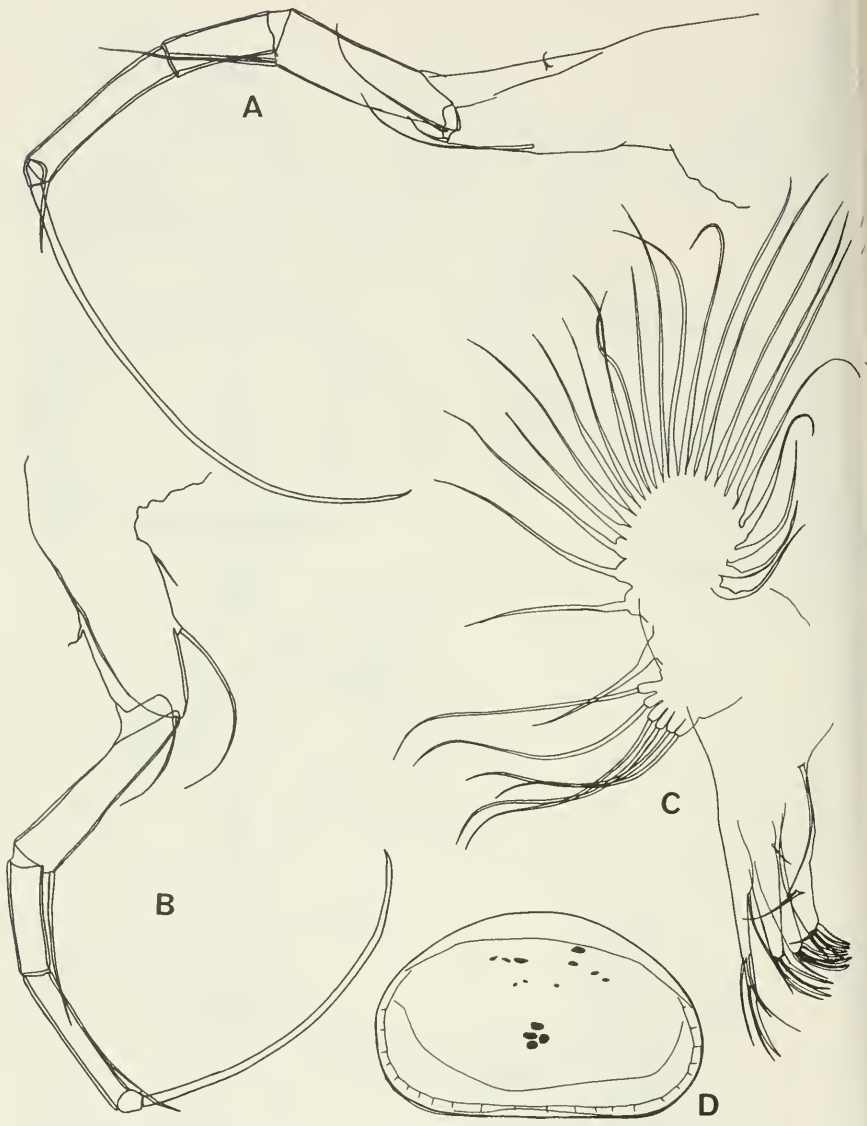

FIGURE 57.—*Zabythocypris heterodoxa* (Chapman): A–C, Male USNM 121617. *Zabythocypris* sp. 1; D, USNM 121398.

A, Third thoracic leg; B, second thoracic leg; C, maxilla; D, left valve exterior. A–C, × 127; D, × 29.

1050 and 1417 fms. It is recorded in the present study from the Mozambique Channel, Gulf of Mexico, and southeast Pacific, at depths of 3100, 1335, and 4332 meters.

FIGURE 58.—*Zabythocypris heterodoxa* (Chapman): Male USNM 121617.
A,B,F, Mandible; C, antennule; D,E, antenna. A,C,D, × 127; B,E,F, × 301.

Affinities.—The specimen illustrated by Chapman is probably a juvenile, because of its nearly circular lateral outline. The southeast Pacific and Mozambique Channel specimens almost certainly belong to different subspecies.

Zabythocypris exaltata (Brady), 1880

Bairdia exaltata Brady, 1880, pl. 9: fig. 2a-d.

Material.—*Challenger* lectotype specimen in slide 132, British Museum (Nat. Hist.) cat. no. 81.5, from station 218, north of New Guinea, at 1075 fms.

Affinities.—This relatively thick-shelled species with nearly circular lateral outline approaches most closely to the Bairdiinae of all species of *Zabythocypris*, and its subdivided muscle-scar pattern is an excellent one on which to trace the homologies between individual scars of the bairdiine and bythocypridine patterns.

Zabythocypris ancipita, new species

Figure 59

Etymology.—Latin *anceps*, two-sided, double, ambiguous; from the conspicuous dimorphism.

Type-specimens.—Holotype USNM 121620; paratypes USNM 121621–121624.

Type-locality.—*Anton Bruun* cruise 7 station 363G.

Diagnosis.—Carapace thin but very large, expanded medially and extremely compressed marginally; lateral outline of one form approaching rectangular, especially in right valve, dorsal margin very gently rounded and so much compressed that dorsal and lateral carapace lamellae are fused together, with pore canals traversing this fused zone just as in the marginal area; second form much less symmetrical in lateral view and more rounded, with steeply sloping posterodorsal margin, narrowly rounded posteroventral margin, anterior margin broadly rounded, venter slightly concave, dorsal marginal area open rather than fused.

Material.—Subfossil specimens only; subrectangular form found at *Anton Bruun* stations 361B (1), 363G (8), 363J (14), and 363K (4); asymmetrical form found at *Anton Bruun* stations 360B (2), 363G (13), 363J (19), and 363K (15) [numbers in parentheses indicate number of specimens in each collection].

Dimensions.—Holotype USNM 121620, subrectangular left valve, length 1.58 mm, height 1.15 mm.

USNM 121621, subrectangular right valve from *Anton Bruun* 363G, length 1.59 mm, height 0.94 mm.

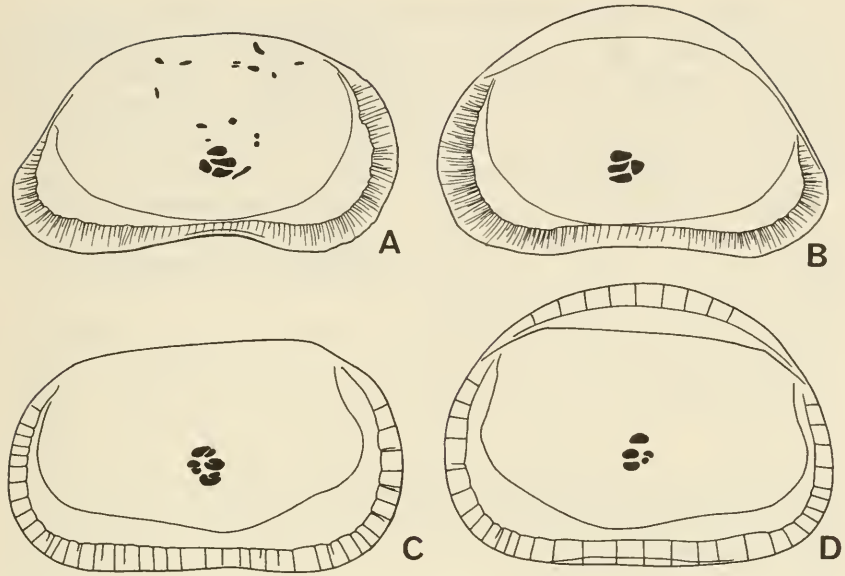

FIGURE 59.—*Zabythocypris ancipita*, n. sp.: A,B, Asymmetrical dimorph, USNM 121622; C, symmetrical dimorph, USNM 121621; D, symmetrical dimorph, USNM 121620. All exterior carapace views. All × 29.

USNM 121622, asymmetrical dimorph from *Anton Bruun* 363G, right valve, length 1.51 mm, height 0.89 mm; left valve, length 1.58 mm, height 1.02 mm.

AFFINITIES.—Despite the extreme differences in lateral outline and compression of left valve dorsal margin, the consistency with which these two morphologic forms occur together in the same samples suggests a linkage between them best explained as sexual dimorphism.

The symmetrical, nearly rectangular, dimorph is very similar in structure to *Z. exaltata* (Brady), which also has a fused dorsal zone in the left valve. However, the lateral outline of the latter is more nearly circular; it is also more robust.

Zabythocypris helicina, new species

FIGURES 54, 55

ETYMOLOGY.—Latin, Greek, *helix*, spiral, coil.

TYPE-SPECIMENS.—Holotype female USNM 121625; paratypes USNM 121626–121629.

TYPE-LOCALITY.—*Anton Bruun* cruise 11 station 179.

MATERIAL.—Eleven adult females and juveniles living at *Anton Bruun* cruise 11 stations 113 and 179 in the southeast Pacific.

Four subfossil specimens at Albatross station 2385 in the Gulf of Mexico.

Diagnosis.—Carapace thin and very compressed; dorsal margin of left valve gently arched, dorsal interlamellar space open, anterior and posterior margins narrowly and nearly equally rounded, ventral margin horizontal; lateral outline of right valve approaching rectilinear, median dorsal margin short and straight, anterodorsal portion short and sloping, posterodorsal margin longer and more steeply sloping.

Female genital lobe of peculiar structure, consisting of broad hemicircular base and long, doubly coiled tube encased in curved tubular sheath. Male with large symmetrical brush-shaped organ, slightly reflexed first thoracic leg.

Dimensions.—Adult female USNM 121625, left valve, length 1.46 mm, height 0.89 mm.

Juvenile male (?) USNM 121626, left valve, length 1.52 mm, height 0.92 mm.

Affinities.—The genital lobe structure is unlike any other described; the other appendage morphology is similar to that of *Z. heterodoxa* (Chapman). No copulatory organ is observable on the only male (juvenile?) specimen.

Zabythocypris species 1

Figure 57*d*

Material.—Four subfossil specimens from *Albatross* stations 5650 and 2808 in the Gulf of Mexico and Indonesia.

Dimensions.—Specimen USNM 121398, left valve, length 1.42 mm, height 0.89 mm.

Affinities.—These specimens, which may include two sexes or even two species, are similar to but not identifiable with *Z. exaltata* (Brady) and *Z. ancipita*, new species.

Anchistrocheles Brady and Norman, 1889

Anchistrocheles Brady and Norman, 1889, p. 110.—Brady, 1890, p. 496.—Müller, 1908, p. 100.

Type-species.—*Anchistrocheles fumata* Brady, 1890, p. 497, pl. 3: figs. 13, 14 (by Brady and Norman, 1889).

Diagnosis.—Carapace small, very delicate, extremely compressed especially marginally, reniform outline; broad fused marginal zone and abundant straight radial pore canals; bythocyprid adductor muscle-scar pattern.

Antenna with short thick podomeres and stout distal claw; distal claws of antenna and thoracic legs with sharply angled tiny terminal hooks; vibratory plate of first thoracic leg with 4 closely spaced, featherless setae and few or no other setae; thoracic legs with podomeres 3 and 4 completely fused, podomere 1 without ventral setae; mandible and maxilla elongated and with reduced setae.

Species included.—Recent species whose soft parts have been described, by original binomen:

Anchistrocheles fumata Brady, 1890
?Anchistrocheles aculeata Müller, 1908
Anchistrocheles bensoni, new species

Species assigned here on the basis of carapace structure:

?Cythere acerosa Brady, 1868a
Bairdia angulata Brady, 1870
Anchistrocheles bradyi Scott, 1905
Anchistrocheles antemacella, new species

Affinities.—The most conspicuous feature of *Anchistrocheles* is its generally juvenile aspect as compared to Bairdiinae structure. This is especially visible in the foreshortened proportions and elimination of certain podomeres and setae of the antennae and thoracic legs. Presumably this is the result of reduction in size.

The widening of the fused marginal zone with increased carapace compression is a trend that is seen also in certain species of *Propontocypris* (*Schedopontocypris*) and especially in *Propontocypris* (*Ekpontocypris*) Maddocks, as well as in many Paradoxostomatidae; in the case of the latter the appendage structure is also deceptively simple. All of these species characteristically inhabit the microfloral jungle encrusting algae, marine grasses, corals, and coral fragment accumulations in coral reefs and other very shallow-water habitats.

Anchistrocheles fumata Brady, 1890

Figure 60*e*, *f*

Anchistrocheles fumata Brady, 1890, p. 497, pl. 3: figs. 13, 14.—Holden, 1967, p. 45, fig. 35.

Material.—Nosy Bé, Madagascar; 9 specimens from 4 samples, all subfossil, in carbonate sand among coral patch reefs just below low tide level.

Dimensions.—USNM 121630, left valve, length 0.61 mm, height 0.32 mm; right valve, length 0.60 mm, height 0.31 mm.

Affinities.—This form is perhaps slightly more highly arched dorsally than that figured by Brady.

Distribution.—Reported by Brady (1890) from intertidal pools of Samoa; by Holden (1967) in fossil Neogene submarine terraces of Hawaii.

Anchistrocheles bradyi Scott, 1905

Figures 60*a–d*

Anchistrocheles bradyi Scott, 1905, p. 373, pl. 1: figs. 34, 35.

Material.—A single juvenile right valve from station LK–12, Galle, Ceylon, from grassy intertidal flats.

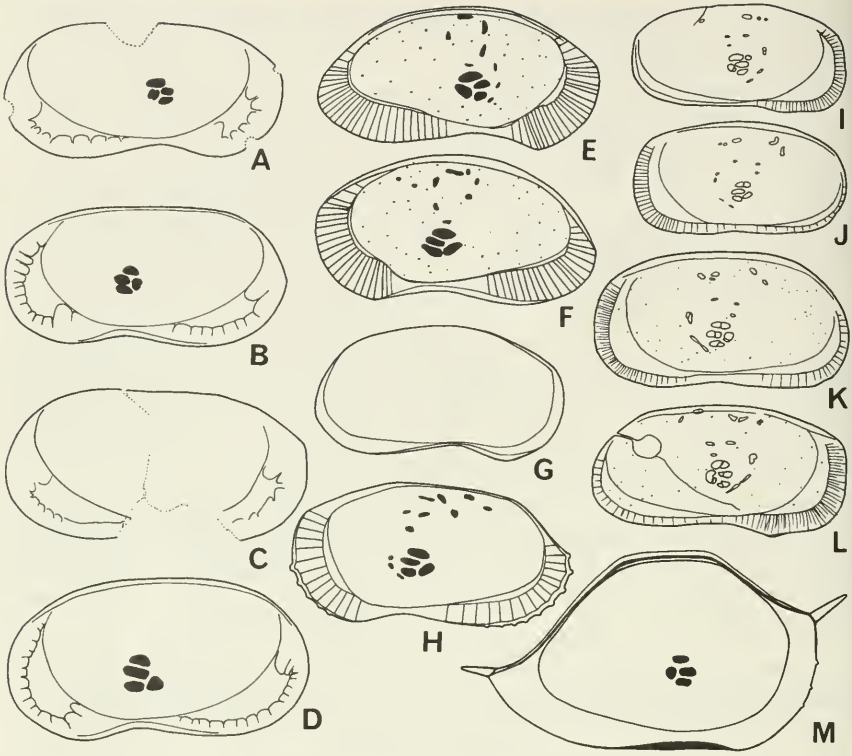

FIGURE 60.—*Anchistrocheles bradyi* Scott: A,B, USNM 121634 from Nosy Bé; C,D, USNM 121633 from Nosy Bé; G, USNM 121632 from Ceylon. *A. fumata* Brady: E,F, USNM 121630 *A.* (?) *angulata* (Brady): H, USNM 121635 from New Zealand. *A. antemacella*, n. sp.: I,J, Juvenile USNM 121642; K,L, adult USNM 121641. *A.* ? sp. aff. *A. aculeata* Müller; USNM 121637.

A–G, I–L, Carapace exterior views; H,M, carapace interior views. A–D,G,M, × 50; E,F,H, × 61; I–L, × 29.

Nosy Bé, Madagascar; 5 specimens from 4 samples, all collected subfossil from carbonate sands near coral patch reefs in less than 10 meters of water.

DIMENSIONS.—USNM 121632 from LK–12, right valve, length 0.68 mm, height 0.37 mm.

USNM 121633 from Nosy Bé, left valve, length 0.84 mm, height 0.44 mm; right valve, length 0.84 mm, height 0.42 mm.

USNM 121634 from Nosy Bé, left valve, length 0.78 mm, height 0.39 mm; right valve, length 0.78 mm, height 0.37 mm.

DISTRIBUTION.—Described originally from the Gulf of Manaar near Ceylon; reported here from Galle Harbor, Ceylon, and Nosy Bé, Madagascar.

Anchistrocheles? angulata (Brady), 1870

FIGURE 60*h*

Bairdia angulata Brady, 1870, p. 199, pl. 27: figs. 11, 12.—Brady, 1880, p. 59, pl. 11: fig. 5a–d.
Anchistrocheles?, new species, of Triebel, 1960, pl. 20, fig. 44a–b.

MATERIAL.—A single juvenile right valve from RM1004, George Sound, New Zealand.

A single juvenile collected living at *Eltanin* station 740.

DIMENSIONS.—Juvenile right valve USNM 121635, length 0.51 mm, height 0.29 mm.

DISTRIBUTION.—Described originally from the Straits of Magellan; a very similar form was reported by Triebel (1960) from Bass Strait.

AFFINITIES.—The *Eltanin* specimen is smaller than the lectotype-designate (Brady, 1870) but otherwise similar to it. The New Zealand specimen is very much smaller and relatively more elongate.

The assignment to *Anchistrocheles* is based on the compressed carapace and bythocyprid scar. Eventually another generic category may be desirable to accommodate this species, *A. aculeata* Müller, and others with bairdian outlines.

Anchistrocheles? sp. aff. *A. aculeata* Müller, 1908

FIGURE 60*m*

Anchistrocheles aculeata Müller, 1908, p. 1, pl. 14: figs. 7–14; pl. 15: figs. 1–5.

MATERIAL.—Six valves collected at *Albatross* station 4693, west of Peru, at a depth of 1142 fms.

DIMENSIONS.—USNM 121637, left valve, length including spines 1.07 mm, length excluding spines 0.92 mm, height 0.55 mm.

AFFINITIES.—*A. aculeata* Müller has more gently rounded lateral outline and has eight small spines along the anterior margin rather than the single long spine of this species; its posterodorsal margin slopes less steeply to the smaller spine located near midheight. Both species have bairdian outline, long terminal spine on left valve, thickly pitted exterior, and bythocyprid muscle-scar pattern. Müller's species was collected at 385 m. depth at the Gauss station, Antarctica. As illustrated by Müller, the mandible and maxilla are attenuate as in *Anchistrocheles*, but the other appendages show normal proportions and podomere-segmentation of *Paranesidea*.

Anchistrocheles bensoni, new species

FIGURES 61, 62

ETYMOLOGY.—Named for Richard H. Benson, who collected this and other exceptionally interesting ostracodes from Walterson Shoal (under unusual hardships, including two broken ribs) during his participation in cruise 7 of the *Anton Bruun*, International Indian Ocean Expedition.

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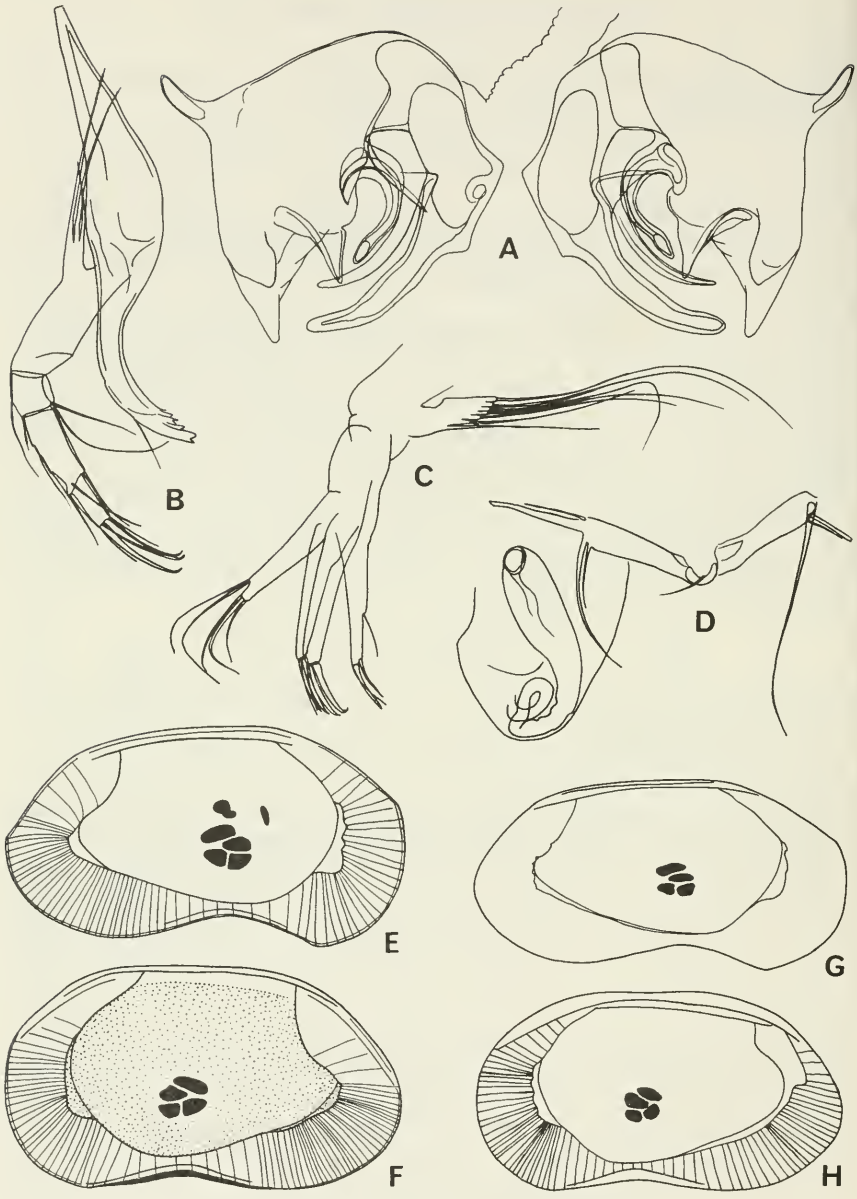

FIGURE 61.—*Anchistrocheles bensoni*, n. ap.: A,G,H, Male USNM 121638; B–F, female USNM 121639.

A, Copulatory organ; B, mandible; C, maxilla; D, genital lobe and furca; E–H, carapace exteriors. A–D, × 301; E–H, × 61.

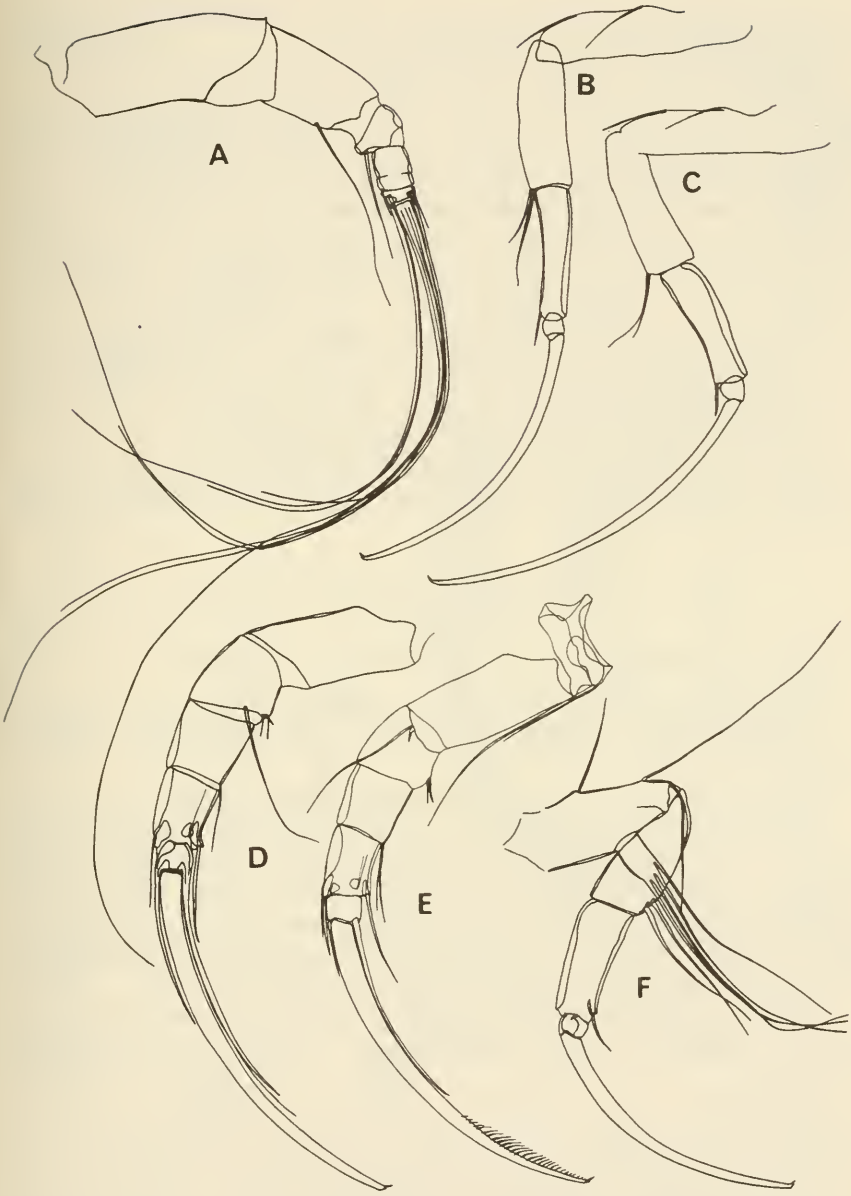

FIGURE 62.—*Anchistrocheles bensoni*, n. sp.: A,D,F, Female USNM 121639; B,C,E, male USNM 121638.

A, Antennule; B, second thoracic leg; C, third thoracic leg; D–E, antennae; F, first thoracic leg. All × 301.

TYPE-SPECIMENS.—Holotype male USNM 121638; allotype female USNM 121639; paratypes USNM 121640.

TYPE-LOCALITY.—*Anton Bruun* cruise 7 station 381B.

DIAGNOSIS.—Carapace reniform in lateral view with straight dorsal margin, broadly rounded anterior and narrowly rounded posterior margins, ventral margin deeply indented; females much larger than males. Fused marginal zone very broad with abundant straight radial pore canals, extending to anterodorsal and posterodorsal areas; inner lamella black; copulatory organ with 5 digitiform projections besides short curved copulatory tube.

DIMENSIONS.—Adult male USNM 121638, left valve, length 0.56 mm, height 0.30 mm; right valve, length 0.57 mm, height 0.28 mm.

Adult female USNM 121639, left valve, length 0.61 mm, height 0.34 mm; right valve, length 0.61 mm, height 0.33 mm.

AFFINITIES.—The carapace features represent extreme development of trends seen in *A. fumata;* the soft-part anatomy is compatible with that of *A.* species 1.

Anchistrocheles antemacella, new species

FIGURE 60*i–l*

Argilloecia cylindrica Sars of Colalongo, 1965, p. 88, pl. 10: fig. 6.

ETYMOLOGY.—Latin *ante*, before + *macellus*, thin.

TYPE-SPECIMENS.—Holotype USNM 121641; paratype USNM 121642–121643.

TYPE-LOCALITY.—*Anton Bruun* cruise 7 station 369A.

DIAGNOSIS.—Carapace thin, moderately inflated, nearly equivalved; anteromarginal zone very strongly compressed; lateral outline approaching rectangular with horizontal dorsal margin, very slightly indented ventral margin, nearly vertical anterior margin, and broadly rounded posterior margin; marginal zone moderately wide and crossed by numerous straight radial pore canals.

MATERIAL.—Subfossil specimens, 62 from *Anton Bruun* stations 361A,G, 363E,J, 366A,C, 369A,D, and 407 in the Mozambique Channel.

DIMENSIONS.—Adult USNM 121641, left valve, length 1.17 mm, height 0.62 mm; right valve, length 1.15 mm, height 0.58 mm.

Juvenile USNM 121642, left valve, length 0.98 mm, height 0.51 mm; right valve, length 0.98 mm, height 0.48 mm.

AFFINITIES.—While the rectilinear outline and abundant short, straight radial pore canals give this species some resemblance to *Zabythocypris*, the equal size and moderate inflation of the valves suggest that it might better be placed in the more flexibly defined category *Anchistrocheles*.

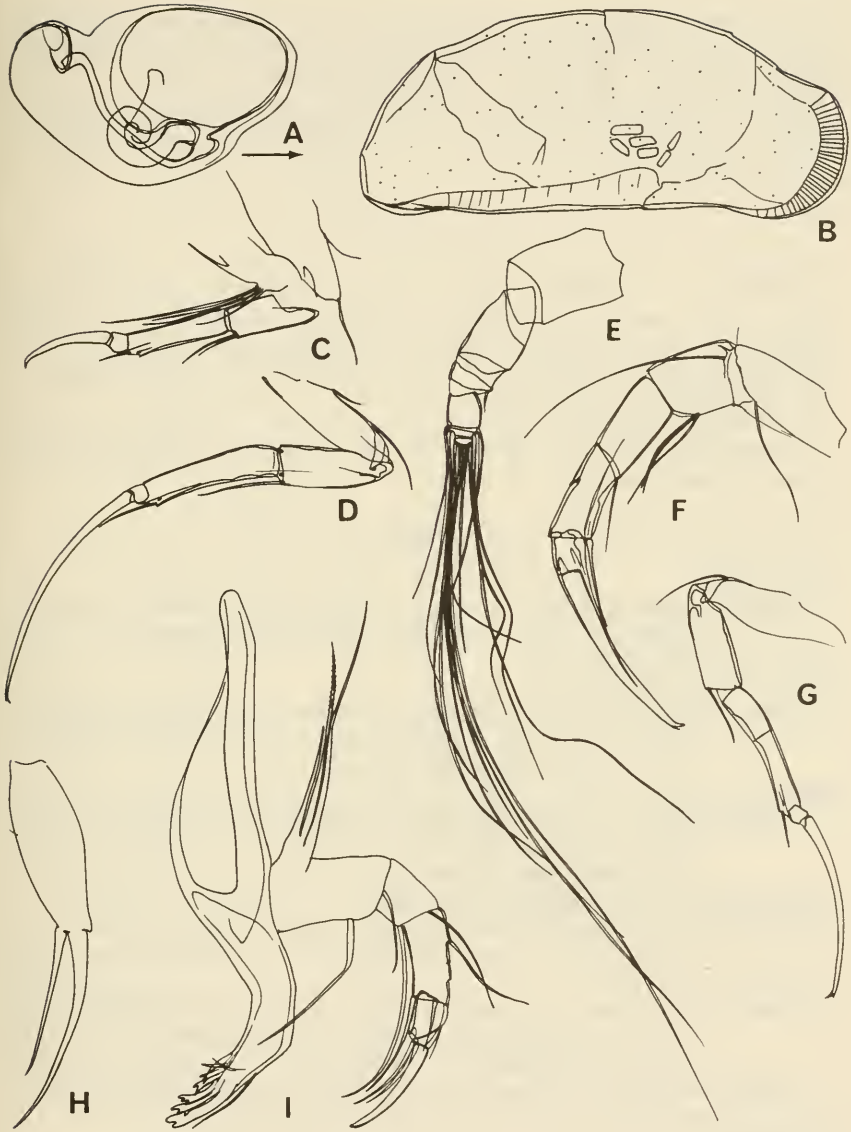

FIGURE 63.—*Anchistrocheles* sp. 1: Female USNM 121644.

A, Genital lobe; B, right valve exterior, somewhat crumpled; C, first thoracic leg; D, third thoracic leg; E, antennule; F, antenna; G, second thoracic leg; H, furca; I, mandible. A,H,I, × 472; B, × 126; C–G, × 301.

The form illustrated and identified as *Argilloecia cylindrica* Sars by Colalongo (1965) is identical in lateral outline with *Anchistrocheles antemacella*. The associated ostracode species of this Le Castella (Plio-Pleistocene) assemblage have close counterparts in the modern abyssal assemblages from which *A. antemacella* is identified (Benson, pers. comm.).

***Anchistrocheles* species 1**

FIGURE 63

MATERIAL.—A single specimen collected living in carbonate sand among patch reefs, just below tide level, at Ambariobe, Nosy Bé, Madagascar. The carapace is partly decalcified and crumpled.

DIMENSIONS.—Crumpled left valve, USNM 121644, length 0.50 mm, height 0.21 mm.

AFFINITIES.—The soft parts of this specimen identify it as a female of *Anchistrocheles*.

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